GNS-XL

FLIGHT MANAGEMENT SYSTEM

Operator's Manual

Global



006-08852-0000
Rev. 4 Nov/04

Honeywell

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Revision History and Instructions

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This revision adds descriptions of operational procedures required to fly three kinds of SIDs.

Insert the contents of this revision packet according to the following instructions:

Title Page	Remove and Replace
Revision History Page	Insert Ahead of Existing Revision History Pages
Section 3	Remove and Replace Pages 3-17 through 3-22
Back Cover Page	Remove and Replace
Back Binder Insert	Remove and Replace

Revision History and Instructions

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Title Page	Remove and Replace
Revision History Page	Insert Ahead of Existing Revision History Page
Table of Contents	Remove and Replace Pages v/vi and xi through xvi
Section 3	Remove and Replace Pages 3-9 through 3-12 Insert Page 3-12a/3-12b after Page 3-12 Remove and Replace Pages 3-13 through 3-20 and Page 3-75/3-76
Section 7	Remove and Replace Pages 7-1/7-2,7-7/7-8, 7-17 through 7-22, 7-35/7-36, 7-43 through 7-66 and insert Pages 7-67 through 7-72
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Add Company Routes (vi, 2-2, 3.36.1, 3-36.2, I-2)

Add Dedicated DME Interface (2-57)

Add Approach Note (3-36.3)

Add Waypoint Type Identifier (2-54, 3-48, 3-49, 3-62)

Revise Procedure Turn (3-41, 3-42, 3-43, 3-44)

Remove H Hot Key (3-57, 3-58, 3-61)

Add Fuel Use Reset Function (ix, 2-48, 3-105, 3-106)

Typographic/Administrative Corrections (Front Covers, 2-1, 2-4, 2-9, 2-10, 2-11, 2-12, 2-27, 2-28, 2-79, 3-1, 3-2, 3-3, 3-4, 3-40, 3-42, 3-43, 3-45, 3-59, 3-60, 7-12, 7-15, 7-20, 7-22, 7-54, 7-55, 7-56, 7-57, 7-58, 7-59, Back Covers)

Revision History and Instructions

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This revision is a complete manual revision and supersedes previous revision level manuals. Superseded manuals should be discarded.

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SECTION 1

DESCRIPTION

OVERVIEW

The GNS-XL Flight Management System is an integrated system designed to give the pilot centralized control for the navigation sensors, computer based flight planning, fuel management, and radio management. The GNS-XL has a full color flat panel LCD display, alpha-numeric and function keys, a Global Positioning Sensor (GPS), and a navigation data base. All these are housed in a panel/pedestal mounted Control Display Unit (CDU).

All aircraft interface requirements are accomplished through the GNS-XL. The system supports analog and digital inputs in any combination. Specific aircraft requirements are programmed into a Configuration Module. This module mounts directly to the rear connector, thus remaining in the aircraft. This allows hardware to be easily moved between aircraft types without changing system configuration. The following is a summary of the digital and analog interfaces:

DIGITAL	ANALOG
AFIS	Altitude
Air Data Computer	Altitude Rate
EFIS	Cross Track Deviation
Fuel Flow	Discretes
Inertial Navigation Sensor	Dual VOR/DME
Inertial Reference Sensor	Fuel Flow
VOR/DME, ADF, XPDR, COMM	Heading
Radio Tuning	HSI Course & Bearing
RPU - VLF/Omega	Roll Steering
Cross Side FMS	True Air Speed
	Vertical Deviation

In addition to the GPS sensor, position information is accepted from up to eight navigation sensors, such as an optional VLF/Omega RPU, inertial position sensors, or VOR/DME radios. These navigation sensor inputs can be blended to form a single composite position. Accuracy of this composite position is enhanced by using the best

characteristics of each type of sensor. For example, an Inertial Reference System (IRS) has excellent short term characteristics while VLF/Omega has excellent long term stability. The internal GPS sensor has excellent overall characteristics and will usually be the dominant sensor during blending. However, when RAIM is available, the GPS sensor is the sole contributor to the composite position.

NOTE: RAIM (Receiver Autonomous Integrity Monitoring) is a quality factor used to determine the accuracy of the GPS position. It is an internal function of the GPS receiver and determines the accuracy of it's navigation solution.

The navigation data base is updated on a 28-day cycle by way of a memory card. This card is inserted in a Personal Computer Memory Card International Association (PCMCIA) slot located under the lower portion of the alpha keyboard. This worldwide database contains over 50,000 waypoints, navaids and airports. It also contains altitudes at appropriate waypoints, SID, STAR, AIRWAY, and APPROACH procedures. In addition to this database, the memory can store up to 999 operator generated waypoints. Individual navigation points can be organized into 56 different stored flight plans, each containing up to 50 waypoints.

Due to the way the GNS-XL database is structured, waypoints must have unique identifiers. However, some duplicate ICAO identifiers exist for more than one waypoint. In these cases the waypoint identifiers are renamed in the database. Two naming conventions are used, one for four character identifiers and one for five character identifiers.

Four character waypoints keep the first four characters and the last two characters of the ICAO airport identifier as shown in the following example.

MA11 at KPRC becomes MA11**RC** in the database.

Five character waypoints keep the first five characters and add the last character of the ICAO airport identifier as shown in the following example.

MA27L at KOAK becomes MA27L**K** in the database.

Additional capabilities of the GNS-XL include direct navigation from present position to any waypoint, and data crossfill capability for dual installations. Trip Plan and Fuel Plan functions are also available. There is capability for creating a PSEUDO-VORTAC (selected

course) to any waypoint and establishing an offset parallel course. NAVs, COMMs, ADFs and transponders can be tuned through the system or by using the individual control heads.

GENERAL TERMS

FIELD: A line of information.

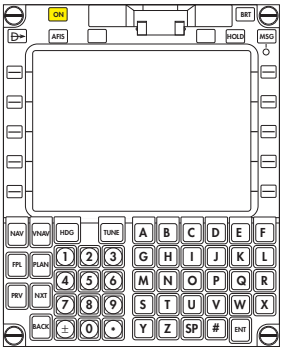
CURSOR: Yellow rectangular box placed over a field to enter or change the information in that field. The cursor is normally out of view unless brought into view by depressing the Line Select Keys on either side of the screen. When information is entered into a field and the **ENT** Key is depressed, the cursor will move to the next enterable field or disappear from the screen when the last field is entered. Blinking of a field indicates that the computer has not accepted the entry because of unreasonable or invalid information.

PAGE: Information is arranged in sections and subsections much like chapters in a book. Individual screen displays are referred to as pages. Each section is selected by depressing the appropriate Display Selector Key located at the top of the keyboard. Each subsequent push of the key will select the next page of that section. A subsection page is selected by depressing the Line Select Key next to the topic desired, then depressing the **ENT** Key. The **PRV** or **NXT** Key can be used to move forward or backward through pages of a subsection. If the first page of a subsection is displayed, the **BACK** Key will exit the subsection.

WAYPOINT: A navigation point consisting of 1 to 6 alpha, numeric characters that has a specific latitude and longitude.

CONTROLS AND INDICATORS

ON:

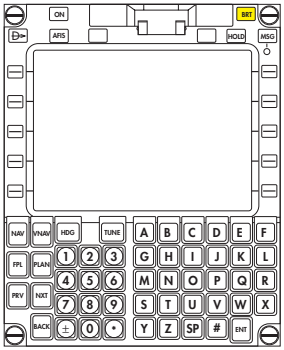


Depress and release the **ON** Key to apply power to the system. There is a warm-up period of approximately 30 seconds. The display illumination will initially be set at 75% of full bright.

Depressing the **ON** Key for approximately three seconds will initiate the system power off sequence. During the sequence the display will show **SYSTEM TURNING OFF.** This is to prevent inadvertent system shutdown.

NOTE: The system is also capable of being turned on and off by cycling aircraft power.

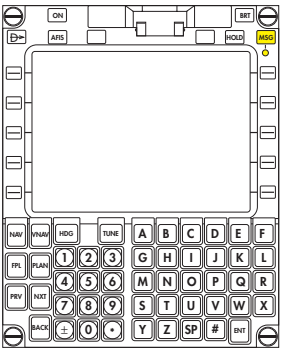
BRIGHTNESS (BRT):



The **BRT** Key is used to change the illumination of the display. This key is also used for parallax adjustment of the Line Select Keys

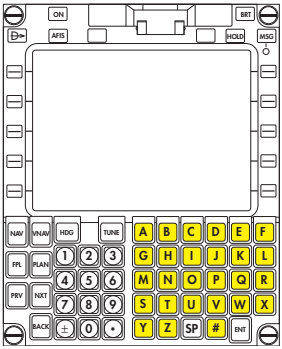
NOTE: The illumination of the front panel and keyboard is normally controlled through the aircraft panel lighting control.

MESSAGE KEY/ANNUNCIATOR (MSG):



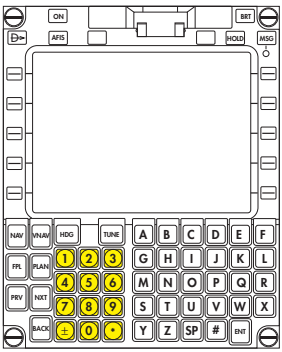
The **MSG** annunciator will flash to alert the operator that a message needs to be viewed on one of the **SYSTEM MESSAGES** or **SENSOR MESSAGES** Pages.

Depressing the **MSG** Key will display the message page. The newest message will be indicated with a flashing asterisk to the left of the message. If the message requires some action be taken by the operator, the **MSG** annunciator will remain on steadily until the action is completed. If no action is required, the **MSG** annunciator will extinguish when the message page is exited.



ALPHA KEYS:

The alpha keys are used to enter the 26 letters of the alphabet, and #.



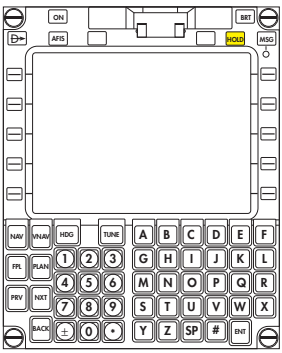
NUMERIC KEYS:

The numeric keys are used to enter numbers 0 to 9, ± and *.

HOLD KEY:

If the cursor is positioned over a waypoint identifier, and it is appropriate to program a Holding Pattern at that waypoint, depressing the **HOLD** Key accesses the Holding Pattern page.

If the cursor is not displayed, depressing the **HOLD** Key accesses the **POSITION FIX** Page and is used for position updates and verification as well as entering the primary navigation mode.



BACK (BACK) KEY:

The BACK Key is used to erase errors and page backward when the cursor is not displayed. It can also be used to change data in a field if the cursor is present.

SPACE (SP) KEY:

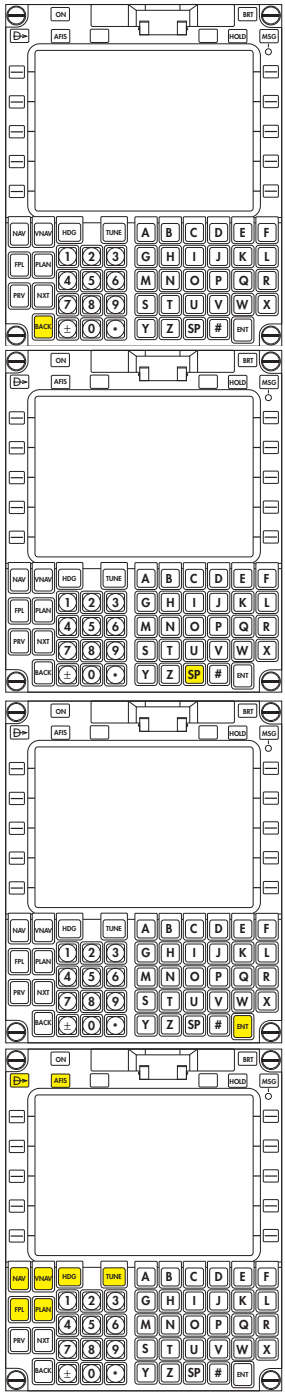
The **SP** Key is used to enter a space when entering a message on an AFIS Page. This key is not functional if AFIS is not installed in the system.

ENTER (ENT) KEY:

When the **ENT** Key is depressed, data is entered into the computer memory.

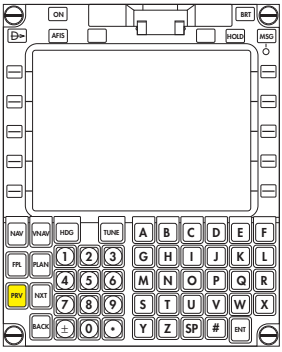
DISPLAY SELECTOR KEYS:

NAV (Navigation), **VNAV** (Vertical Navigation), **AFIS** (Airborne Flight Information System), **FPL** (Flight Plan), **PLAN** (Planning), **HDG** (Heading), **TUNE** (Radio Tuning), and **D→** (Direct) are used to select the pages pertaining to that particular section. The first page of a section is displayed first when a Display Selector Key is pressed. With each subsequent press of the Key, the next sequential page will be displayed.



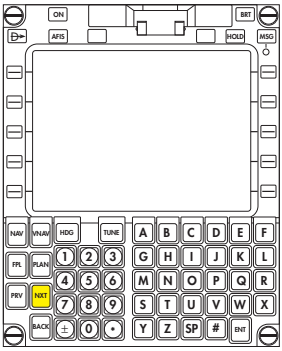
PREVIOUS (PRV) KEY:

The **PRV** Key is used to display the previous page of a section or subsection. This key also allows the operator to remain in a section or subsection by looping from the first to the last and back to the first page of that section or subsection.



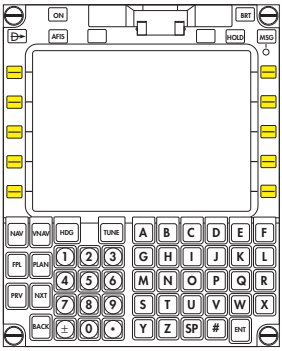
NEXT (NXT) KEY:

The **NXT** Key is used to display the next page of a section or subsection. This key also allows the operator to remain in a section or subsection by looping from the first to the last and back to the first page of that section or subsection.



LINE SELECT KEYS:

These keys are used to place the cursor in the field next to that key. Each line select key controls 2 lines of text. White symbols (< or >) displayed on either side of the display indicate active Line Select Keys for each individual page.



COLORS:

The CDU displays are color coded to assist the operator in recognizing information. The following is a list of these colors and their meanings:

Magenta	**Lateral TO Waypoint and Vertical TO Waypoint,**
Yellow	**FROM Waypoint** **Caution Messages** **Data entered, but not yet accepted by the computer.**
Cyan	**Date and Times** **Tuned Frequencies or Codes** **Altitudes**
Green	**Navigation and Fuel Data** **General Page Data**
White	**Page Titles and Prompts**
Red	**Warnings**
Blue	**Waypoint Numbers**

SECTION 2

PAGE DISPLAY DEFINITIONS

The following section contains definitions pertaining to information and format seen when a particular function key is depressed.

PAGE DISPLAYS AT POWER-UP

For a better understanding of the GNS-XL functions, this section should be reviewed prior to operating the system.

SELF TEST PAGE

For the first 30 seconds after the system if is turned on, the computer performs extensive internal tests that must be successfully completed before proceeding further. If the system detects a problem the **SELF TEST** display may be replaced by a **NO DATA RECEIVED** message. The unit may have to be removed for service.



Figure 2-1

INITIALIZATION PAGE

After the Self Test is successfully completed, the **INITIALIZATION** Page will be displayed. Refer to Figure 2-2.



Figure 2-2

DATE:

The current Greenwich Date is displayed as day, month and year.

GMT:

Time of day is displayed in Greenwich Mean Time hours and minutes.

IDENT:

Displays the airport identifier for the airport closest to the system shut down position. Dashes will be displayed when the cursor is placed over the position **(POS)** field.

POS:

Displays the last system position at shut down. Dashes are displayed when the cursor is over the **IDENT** field.

PART NUMBER AND SOFTWARE MODIFICATION STATUS:

The bottom line of the display shows the unit part number and the software level of the unit.

*NOTE: This page cannot be recalled once **DATE, GMT,** and **POS** have been entered. In order to display this again, the system must be turned off and then turned back on.*

FLIGHT PLAN SECTION (FPL KEY)

Upon pressing the **FPL** Key the **FLIGHT PLAN LIST 1/1** Page will be displayed and the following can be observed.

*NOTE: The **FLIGHT PLAN LIST** page will be automatically displayed if the **ENT** key is depressed at least three times while on the initialization page.*

FLIGHT PLAN PAGES

*NOTE: If AFIS equipped the first page displayed after system initialization will be the **AFIS FPL LIST** page in lieu of the **FLIGHT PLAN LIST** page.*

*NOTE: If the data base contains company routes, the first page displayed after system initialization will be the **COMPANY ROUTES** page in lieu of the **FLIGHT PLAN LIST** page. If both AFIS and Company Routes are present, the **COMPANY ROUTES** page is displayed first.*

FLIGHT PLAN LIST 1/1 (Page 1 of 1)

The **FLIGHT PLAN LIST** page will be displayed automatically after system initialization. If the initialization airport matches a departure airport on the **FLIGHT PLAN LIST**, the cursor will automatically be positioned over the first matching Flight Plan.

There are seven pages possible with a maximum of 56 flight plans stored in non-volatile memory. Each stored flight plan's origin and destination points are listed in alphabetical order. (Figure 2-3)



Figure 2-3

A new **FLIGHT PLAN LIST** Page is created when the previous page has eight flight plan origin-destination pairs on it. Using the **PRV** or **NXT** Key pages through the Flight Plan List subsection. (Figure 2-3)

FLIGHT PLAN "X" 1/1 (Page 1 of 1)

"X" can be Flight Plan numbers 1 through 56. (Figure 2-4)

This stored flight plan page is accessed through the **FLIGHT PLAN LIST** Page by pressing the Line Select Key corresponding to the desired flight plan number, thus, placing the cursor over that number, then pressing **ENT.** (Figure 2-3)



Figure 2-4

Waypoint Identifiers:

Waypoint identifiers may consist of from one to six alphanumeric characters. Up to 50 waypoint identifiers may be placed on each stored Flight Plan. An identifier may be used more than once on the same Flight Plan. (Figure 2-4) Other indications can be as follows:

• Indented Waypoints: Indicates a SID, STAR, or APPROACH procedure is part of the Flight Plan. (Figure 2-4)



Figure 2-5

• **HP** (Holding Pattern): Indicates a holding pattern is programmed at a particular waypoint. (Figure 2-5)

• **PT** (Procedure Turn): Indicates a procedure turn is programmed at a particular waypoint.

• **++++++:** A flight plan discontinuity "fence" separating the missed approach waypoint from the rest of the approach (Figure 2-5). The system will fly current track beyond the last waypoint prior to the fence but no Auto Leg change will occur. No Altitude constraints will be displayed beyond the fence. This type of fence will not cause waypoints of the active flight plan to be deleted prior to the fence if a waypoint beyond the fence is selected using the D→ function.

• **IAF** (Initial Approach Fix): Automatically loaded from the data base when a non-precision approach is selected.

• **ARC** (DME Arc end waypoint): Automatically loaded from the data base when a non-precision approach is selected.

• **FAF** (Final Approach Fix): Automatically loaded from the data base when a non-precision approach is selected.

• **MAP** (Missed Approach Point): Automatically loaded from the data base when a non-precision approach is selected.

• **------:** "fence" indicating a discontinuity in the flight plan. No Auto Leg changes will take place beyond the last waypoint prior to the fence and no **ALT, ETE, ETA,** or **DIS** will be displayed. If a D→ is performed to a waypoint beyond this type of fence all waypoints prior to the fence will be deleted from the active flight plan.

• ********** : Follows the last waypoint on the Flight Plan and indicates where the next waypoint entry will normally begin.

DEPART:

Used to access the **DEPARTURE** Page to enter a Standard Instrument Departure (SID). (Figure 2-5)

ARRIVE:

Used to access the **ARRIVAL** Page to enter a Standard Terminal Arrival (STAR) or Profile Descent. (Figure 2-5)

APPROACH:

Used to access the **APPROACH** Page to enter a non-precision approach. (Figure 2-5)

XFILL: Used to transfer information between systems in a dual system installation. In a single system installation, this prompt will not be displayed.

SELECT or **INVERT:**

Used to transfer a Stored Flight Plan to the **ACTIVE FLIGHT PLAN** Page. Depressing the **BACK** Key when the cursor is over this field brings up **INVERT?**, which is used to transfer the waypoint of a Stored Flight Plan to the **ACTIVE FLIGHT PLAN** Page in reverse order. (Figure 2-5)

ERASE:

Used to clear an entire flight plan. (Figure 2-5)

DEPARTURE Page

Accessed by pressing the Line Select Key adjacent to **DEPART** on the **FLIGHT PLAN** Page. With the cursor over **DEPART** press **ENT.**

*NOTE: Each field will prefill if there is only one choice for that particular field or **DEPARTURE** airport field will flash if no Departure is available. A **NO SIDS AVAILABLE** message will appear at the bottom of the screen.*

DEPARTURE:

Departure airport identifier. This field prefills if first waypoint on the flight plan is an airport or runway, or it can be manually entered. (Figure 2-6)

RUNWAY:

Departing runway. This field prefills if first waypoint on the flight plan is a runway, or it can be selected from a list made available by pressing the Line Select Key adjacent to the **RUNWAY** field. (Figure 2-6)

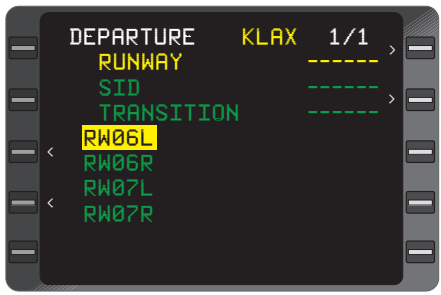


Figure 2-6

SID:

The Standard Instrument Departure (SID) can be selected from a list made available by pressing the Line Select Key adjacent to the **SID** field.

TRANSITION:

The Transition waypoint can be selected from a list made available by pressing the Line Select Key adjacent to the **TRANSITION** field.

WAYPOINTS OF SID:

The waypoints that constitute the SID**.** (Figure 2-7)

SELECT?:

Used to select the defined SID. (Figure 2-7)

ERASE:

Used to erase a SID. (Figure 2-7)



Figure 2-7

ARRIVAL Page

Accessed by pressing the Line Select Key adjacent to **ARRIVE** on the **FLIGHT PLAN** Page. With the cursor over **ARRIVE** press **ENT.**

*NOTE: Each field will prefill if there is only one choice for that particular field or **ARRIVAL** field will flash if no Arrival is available, and a **NO STARS AVAILABLE** message will appear at the bottom of the screen.*

ARRIVAL:

Arrival airport identifier. This field prefills if the last waypoint on the flight plan is an airport or runway, or can be manually entered. (Figure 2-8)

RUNWAY:

Arriving runway. This field prefills if the last waypoint on the flight plan is a runway, or can be selected from a list made available by pressing the Line Select Key adjacent to the **RUNWAY** field. (Figure 2-8)

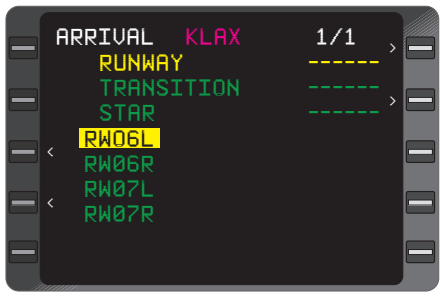


Figure 2-8

TRANSITION:

The Transition waypoint may be prefilled or selected from a list made available by pressing the Line Select Key adjacent to the **TRANSITION** field.

STAR:

The Standard Terminal Arrival (STAR) can be selected from a list made available by pressing the Line Select Key adjacent to the **STAR** field.

WAYPOINTS OF STAR:

The waypoints that constitute the STAR. (Figure 2-9)

SELECT?:

Used to select the defined STAR. (Figure 2-9)

ERASE:

Used to erase a STAR. (Figure 2-9)



Figure 2-9

APPROACH Page

Accessed by pressing the Line Select Key adjacent to **APPROACH** on the **FLIGHT PLAN** Page. With the cursor over **APPROACH** press **ENT.**

*NOTE: Each field will prefill if there is only one choice for that particular field or Approach Airport field will flash if no Approach is available and a **NO APPROACH AVAILABLE** message will appear at the bottom of the screen.*

APCH:

Approach airport identifier. This field prefills if last waypoint on the flight plan is an airport or runway, or can be manually entered. (Figure 2-10)



Figure 2-10

RUNWAY:

Approach runway prefills if only one runway is available, last waypoint on Flight Plan is a runway, or can be selected from a list made available by pressing the Line Select Key adjacent to the **RUNWAY** field. (Figure 2-11)



Figure 2-11

TYPE (Circle, VOR, NDB, or RNAV):

Type may be prefilled or selected from a list made available by pressing the Line Select Key adjacent to the **TYPE** field.

*NOTE: If the runway selected on the Approach Page differs from the runway dictated by the STAR, **"SEL RWY FROM STAR PG"** is displayed at the bottom of the screen.*

TRANSITION:

The Transition waypoint may be prefilled or selected from a list made available by pressing the Line Select Key adjacent to the **TRANSITION** field. (Figure 2-10)

WAYPOINTS OF APPROACH:

The waypoints that constitute the **APPROACH.** (Figure 2-11)

- **HP** (Holding Pattern):
 Indicates a holding pattern is programmed at a particular waypoint. (Figure 2-11)
- **PT** (Procedure Turn):
 Indicates a Procedure Turn is programmed at a particular waypoint.
- **ARC** (DME ARC):
 Indicates a DME ARC is programmed at a particular waypoint.
- **IAF:**
 Indicates the Initial Approach Fix.
- **FAF:**
 Indicates the Final Approach Fix.
- **MAP:**
 Indicates the Missed Approach Fix.

• **FCF :**
Indicates Final Approach Course Alignment Fix.

• **++++++:**

Separates the missed approach procedure waypoint from the rest of the approach. When the approach is flown, the system will continue to provide guidance along the final approach course and beyond the **MAP** until the pilot manually sequences to the missed approach waypoint by using a **DIRECT TO** or **HEADING** mode procedure. (Figure 2-11) No Auto Leg changes will occur beyond the last waypoint prior to the fence. This type of fence will not cause waypoints of the active flight plan to be deleted prior to the fence if a waypoint beyond the fence is selected using the ⇹ function.

SELECT?:

Used to select the defined **APPROACH**. (Figure 2-11)

ERASE:

Used to erase an **APPROACH.** (Figure 2-11)

AIRWAY Page

Enroute Airways may be manually entered on a Flight Plan Page by preceding the route or airway ident with a pound sign **(#),** e.g., **#J** (Jet Airway), **#V** (VOR Airway), **#UG** (Upper Green)or **#R** (Red Airway). The preceding waypoint on the Flight Plan must be part of the Airway being entered in order for the Airway to be accepted. This waypoint will normally be the From waypoint on the AIRWAY Waypoint Page.

AIRWAY:

Airway identifier. (Figure 2-12)

FR:

Starting point on airway. (Figure 2-12)

TO:

Ending point on airway as selected by the operator. (Figure 2-12)

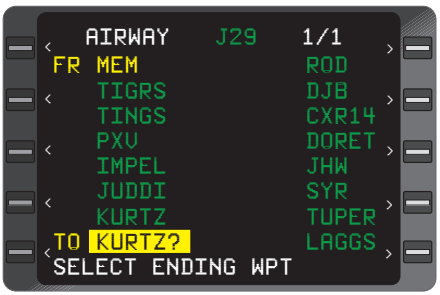


Figure 2-12

SELECT ENDING WPT:

Select the desired ending waypoint on the airway, by moving the cursor up or down and depress **ENT.** (Figure 2-12)

ACTIVE FPL (Flight Plan)Page

FR:

Current FROM waypoint. May also display **DIRECT, PSEUDO VORTAC, DME ARC,** or **PROCEDURE TURN.** (Figure 2-13)



Figure 2-13

TO:

Current **TO** waypoint. (Figure 2-13)

Waypoint Identifiers:Up to **100** waypoint identifiers may be placed on the Active Flight Plan Pages. An identifier may be used more than once on the same Flight Plan.

- Indented Waypoints: indicate a **SID, STAR,** or **APPROACH** Procedure is part of the Flight Plan. (Figure 2-13, **DFW**)

- **HP** (Holding Pattern): indicates a holding pattern is programmed at a particular waypoint. (Figure 2-14)

- **PT** (Procedure Turn): indicates a procedure turn is programmed at a particular waypoint.



Figure 2-14

------: A "fence" separating the current FR/TO leg from the originally selected Active Flight Plan when the TO waypoint is not on the original Flight Plan. Also separates non-continuous Flight Plan segments. (Figure 2-13) No Auto Leg change will occur to waypoints that appear after the fence. This type of fence will not cause waypoints of the active flight plan to be deleted prior to the fence if a waypoint beyond the fence is selected using the ⇹ function.

NOTE: When a "fence ***(++++++)*** *appears in an Approach it separates the missed approach holding fix from the rest of the approach. (Figure 2-14) No Auto Leg change will occur to waypoints beyond the fence.*

******:

Same as stored Flight Plan Page.

DEPART:

Same as stored Flight Plan Page.

ARRIVE:

Same as stored Flight Plan Page.

APPROACH:

Same as stored Flight Plan Page.

ETA: (ETE/DIS/ALT)

Estimated Time of Arrival at each waypoint on the Active Flight Plan based on current groundspeed. (Figure 2-15)



Figure 2-15

*NOTE: When the cursor is placed over the **ETA** field and the **BACK** Key is pressed, **ETE, DIS,** or **ALT** can be displayed. Press **ENT** to select the desired option. No **ETE, ETA, ALT** or **DIS** information is displayed for waypoints beyond the missed approach "fence" (++++++) or the flight plan discontinuity (------).*

ETE:

Estimated Time Enroute between waypoints on the Active Flight Plan based on current groundspeed.

DIS:

Distance between each waypoint on the Active Flight Plan.

ALT:

Constraint altitude and waypoint offset of programmed VNAV waypoints for applicable waypoints on the Active Flight Plan (Figure 2-16).



Figure 2-16

*NOTE: No database altitude constraints will be displayed at the **MAP** if the **MAP** is abeam or beyond the runway threshold . No altitude constraints are displayed on an approach if a **PT** is part of the approach procedure.*

The following may appear in the waypoint altitude field:

- **FL:** Flight Level
- **A:** at or above
- **B:** at or below
- **G:** glide path (programmed Flight Path Angle)

NOTE: If an approach is programmed at the destination airport, and the MAP is the end of the runway, the altitude value displayed next to the MAP is approximately 50 feet above the runway threshold elevation. If the MAP is prior to the end of the runway and the approach is straight-in, the altitude displayed at the MAP is computed based on a line drawn from the FAF through the MAP to a point 50 feet above the runway threshold. The altitude may not be the MDA (Figure 2-16). If no approach is programmed, the altitude value will be the airport elevation regardless of runway selection. The MAP altitude is shown in yellow.

*The Waypoint VNAV offset is given in nautical miles where a negative (-)offset is prior to the waypoint (Figure 2-16, interpreted as "cross ten miles before **RYMES** at **3000** feet") and a positive offset is after the waypoint. If dashes appear in the altitude constraint field, NO altitude is programmed at that waypoint.*

ERASE:

Same as for Stored Flight Plans except the current FROM/TO leg cannot be erased. The Active Flight Plan is automatically erased upon system shut-down.

NAVIGATION SECTION (NAV KEY)

Upon pressing the **NAV** Key the **NAVIGATION 1/4** Page will be displayed and the following can be observed.

NAVIGATION PAGES

*NOTE: If AFIS is installed in the system, the **NAV** section will consist of five pages.*

NAVIGATION 1/4 (Page 1 of 4)

FR:

The FROM waypoint identifier is displayed on the left. If the system has a valid ground speed, the time of departure or time overhead at that waypoint displayed on the right. This line can also display **DIRECT, HOLD, PROCEDURE TURN, DME ARC** or **PSEUDO VORTAC.** (Figure 2-17)

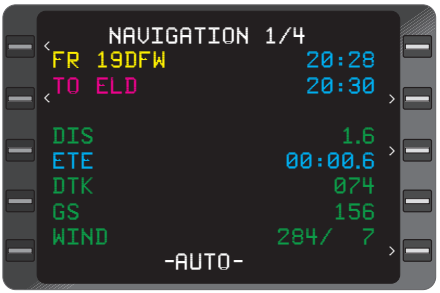


Figure 2-17

TO:

The **TO** waypoint identifier is displayed on the left. If the system has a valid ground speed, the ETA at that waypoint is displayed on the right. The **TO** field may also display **AR, HP** or **PT** if the waypoint indicates a DME ARC, Holding Pattern or Procedure Turn. The ETA field can be changed to display constraint altitude and waypoint offset distance if an altitude constraint has been programmed at the current **TO** waypoint by placing the cursor over this field and dressing the **BACK** Key (Figure 2-17) See Section 3 for the procedure.

NX:

This line is normally blank (Figure 2-18) except during Waypoint Alert (30 seconds prior to crossing the **TO** waypoint). In this case the next (**NX**) waypoint identifier on the Active Flight Plan and the ETA at that waypoint is displayed (Figure 2-19). When a Procedure Turn, Holding Pattern, Heading, or Heading Intercept mode is in use, appropriate information pertaining to that mode will be displayed in this field.

DIS:

The distance in nautical miles and tenths from the aircraft present position to the **TO** waypoint. During Waypoint Alert, the distance in whole nautical miles to the **NX** waypoint on the Active Flight Plan is displayed in parentheses. (Figure 2-18)

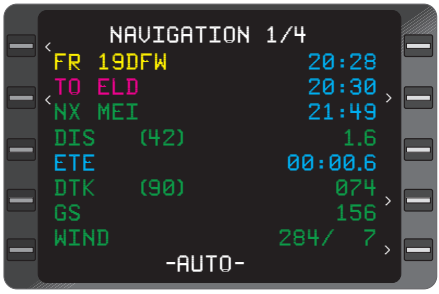


Figure 2-18

ETE:

The estimated time enroute in hours, minutes and tenths, from the aircraft present position to the **TO** waypoint based on current groundspeed. (Figure 2-18)

DTK:

The desired track is the Great Circle course in whole degrees between the FROM and TO waypoints. When in the **PSEUDO VORTAC** mode, the **DTK** is entered by the operator. During the Waypoint Alert, desired track to the next (**NX**) waypoint on the Active Flight Plan is displayed in parentheses. (Figure 2-18)

*NOTE: The **DTK** field will be dashes if the FROM waypoint or present position are north of N 70° or south of S 60° Latitude, unless a manual MAG VAR is entered or a discrete MAG/True switch is moved to the True position.*

GS:

The current groundspeed. (Figure 2-19)

WIND:

The current wind direction referenced to True North and speed in knots. (Figure 2-19)

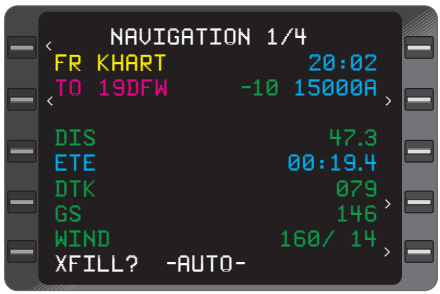


Figure 2-19

XFILL:

If the aircraft is configured for dual systems, the **XFILL** prompt will appear on line 10 indicating the systems contain dissimilar data.

*NOTE: **XFILL** will not appear when DME ARC, ARC Intercept, Procedure Turn or Holding Pattern are in progress on the system performing the procedure.*

AUTO:

The leg change mode. **AUTO** or **MAN,** may be selected if the cursor is over this field using the **BACK** Key. (Figure 2-19) If **AUTO** is selected the system will sequence to the next leg on the FPL. If **MAN** is selected the system will not sequence to the next leg on the FPL and fly the current track.

NAVIGATION 1/4 with a Holding Pattern, Procedure Turn, Heading, or Heading Intercept Programmed.

HOLD:

Indicates that a Holding Procedure has been initiated and is displayed 30 seconds prior to crossing the HP waypoint. (Figure 2-20)

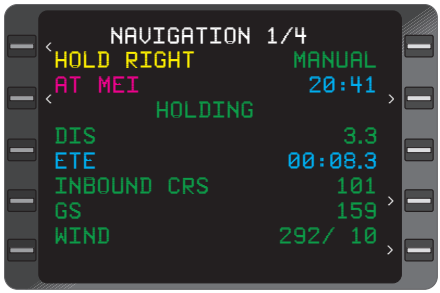


Figure 2-20

• **RIGHT or LEFT:**

Indicates the programmed turn direction around the holding pattern as entered on the **HOLD** Page. (Figure 2-20)

• **MANUAL** or **AUTO:**

Indicates the programmed exit mode as entered on the Hold Page. Selecting **MANUAL** initiates a continuous hold at the fix until some action is taken by the pilot to exit the hold. Selecting **AUTO** will cause the aircraft to **EXIT HOLD** the next time the aircraft passes over the fix (Figure 2-21). If **AUTO** is programmed during the hold procedure, the aircraft will sequence to the next waypoint on the Active Flight Plan the next time the hold fix is crossed. This field can be edited using the **BACK** Key when the cursor is over this field. (Figure 2-20)

AT:

The Holding Pattern procedure is in progress at the **TO** waypoint and the ETA next time over the holding fix if ETA has been selected and the system has a valid ground speed. This field can also display the following: (Figure 2-20)

• **HP** (Holding Pattern):

Indicates a holding pattern is programmed at the **TO** waypoint.

• **PT** (Procedure Turn):

Indicates a procedure turn is programmed from the database at the **TO** waypoint. The airplane will fly the procedure turn. The next time over the **PT** waypoint, the system will sequence to the following waypoint on the flight plan.

• **AR** (DME Arc)

Indicates a DME Arc is programmed at the **TO** waypoint.

HOLDING STATUS MESSAGE: (Line 4)

• DIRECT ENTRY:

Indicates the system will use a direct entry to the holding pattern. (This message appears 30 seconds prior to entering the holding procedure and changes to **HOLDING** after crossing the fix.) (Figure 2-20)

• TEARDROP ENTRY:

Indicates the system will use a teardrop entry to the holding pattern. (This message appears 30 seconds prior to entering the hold procedure and changes to **HOLDING** after crossing the fix the second time.)

• PARALLEL ENTRY:

Indicates the system will use a parallel entry to the holding pattern. (This message appears 30 seconds prior to entering the hold procedure and changes to **HOLDING** after crossing the fix the second time.)

• HOLDING:

Normal status while holding.

• EXIT HOLD:

Indicates the system will exit the holding pattern the next time over the holding fix. The **ETE** to the holding fix is also displayed.

DIS:

The direct distance in nautical miles and tenths from the aircraft present position to the holding fix. (Figure 2-21)

ETE:

The estimated time enroute to the next time over holding fix based on the path around the Hold "racetrack". (Figure 2-21)

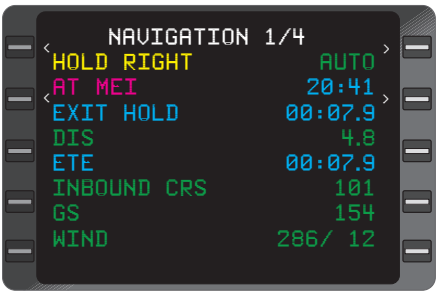


Figure 2-21

INBOUND CRS (course):

The inbound holding course in whole degrees. (Figure 2-21)

GS:

The current groundspeed. (Figure 2-21)

WIND:

The current wind direction referenced to True North and speed in knots. (Figure 2-21)

*NOTE: The leg change mode (**AUTO** or **MAN** normally displayed on the last line of **NAVIGATION** Page 1) is not displayed while holding.*

NAVIGATION 2/4 (Page 2 of 4)

Pressing the **NAV** Key again will display the second **NAVIGATION** Page and the following can be observed.

FR/DIRECT/HOLD/PROCEDURE TURN/DME ARC:

Same as discussed for **NAVIGATION 1/4.**

TO/AT/AR/HP/PT:

Same as discussed for **NAVIGATION 1/4.**

NX/Holding Status:

Same as discussed for **NAVIGATION 1/4.**

WIND:

The first field displays headwind/tailwind in knots with an up arrow (↑) for tailwind or a down arrow (↓) for headwind. The second field displays the crosswind component in knots with a right pointing arrow (→) for a left crosswind or a left pointing arrow (←) for a right crosswind. (Figure 2-22)

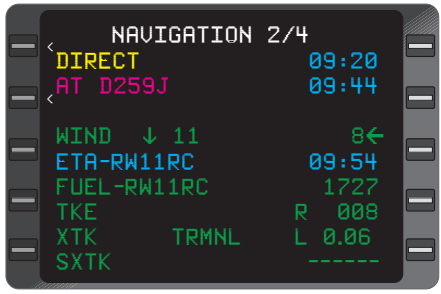


Figure 2-22

ETA:

Estimated Time of Arrival at the last waypoint on the Active Flight Plan prior to a "fence" (- - - - - or ++++++). A "fence" is a discontinuity in the flight plan. No data is computed beyond the fence and there is no Auto Leg change across the fence. (Figure 2-22)

FUEL:

Estimated fuel remaining at destination. (Figure 2-22)

TKE:

The Track Angle Error as defined as the difference between the desired track and the actual track in degrees. **R** (right) and **L** (left) are displayed to show the direction of error in relation to the desired track.

XTK:

The crosstrack distance is the lateral displacement of the aircraft in nautical miles and tenths left or right of the desired track (125 NM maximum). **TRMNL, APRCH** or **ENRTE** is displayed to indicate the current CDI sensitivity. A parenthesis around any of these indicates the displayed sensitivity has been selected manually. See Section 3 for operating procedures (Figure 2-22). Scaling for the **TRMNL, APPR,** and **ENRTE** CDI sensitivity is as follows:

Enroute:	5NM full scale deflection.
Terminal:	1NM full scale deflection.
Approach:	0.3NM full scale deflection.

SXTK:

The selected crosstrack distance entered by the pilot to provide steering to an offset course parallel to the desired track (99.9 NM maximum). (Figure 2-22)

NAVIGATION 3/4 (Page 3 of 4)

Pressing the **NAV** Key again will display the third **NAVIGATION** Page and the following can be observed.

FR/DIRECT/HOLD/PROCEDURE TURN/DME ARC:

Same as **NAVIGATION 1/4.**

TO/AT/AR/HP/PT:

Same as **NAVIGATION 1/4.**

NX/Holding Status:

Same as **NAVIGATION 1/4.**

DRIFT:

The drift angle, in whole degrees, left or right of aircraft heading compared to current track. (Figure 2-23)

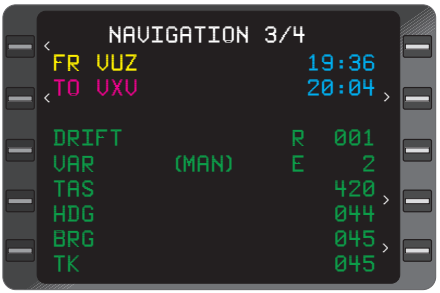


Figure 2-23

VAR:

The magnetic variation value in whole degrees computed automatically between N70 00.0 and S 60 00.0 latitude. Manual variation can be entered and overrides the automatic computation. Manual entry of variation is required north of N70:00.0 and south of S60:00.0 latitude. **(MAN)** will be displayed in the **VAR** field after a manual entry is made. See Section 3 for procedures. (Figure 2-23)

TAS:

The aircraft true airspeed in knots received from the Air Data Computer. If **TAS** is manually inserted, **MAN** will be displayed. (Figure 2-23)

*NOTE: The maximum enterable manual **TAS** is 850 knots. The **TAS** field is enterable only if airdata is invalid.*

HDG:

The heading input received from an IRS or the aircraft compass system. If **HDG** can be manually inserted, **MAN** will be displayed. (Figure 2-23)

BRG:

The bearing in whole degrees from the aircraft present position to the TO waypoint. (Figure 2-23)

TK:

The track angle in whole degrees. (Figure 2-23)

NAVIGATION 4/4 (Page 4 of 4)

Pressing the **NAV** Key again will display the fourth **NAVIGATION** Page and the following can be observed.

IDENT:

A waypoint identifier of a fix to be overflown can be entered here to update the system position. (Figure 2-24)

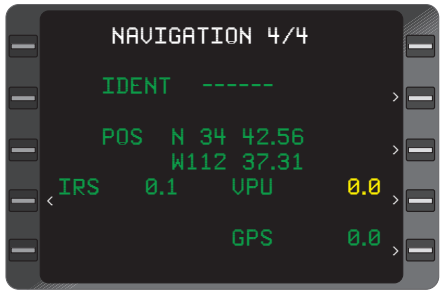


Figure 2-24

POS:

The current composite position (latitude and longitude) computed in degrees, minutes, and hundredths of minutes. (Figure 2-24)

VLF, IRS/INS, VPU, and **GPS:**

A listing of all interfaced sensors. The radial difference between the individual sensor position and the composite position is displayed in nautical miles and tenths. Sensors not being used in the composite position solution will display the radial difference in yellow. Sensors being used will display the radial difference in green. The GPS sensor will normally be the sole contributing sensor to the composite position as long as RAIM is available. (Figure 2-24)

NOTE: IRS radial error is always green because velocity values are used to aid GPS position.

VLF SUBSECTION PAGES

*NOTE: The sensor **SUBSECTION** Pages may be accessed by placing the cursor over the individual position sensor and pressing the **ENT** Key. Use the **NAV, PRV** or **NXT** Key to page through the sensor **SUBSECTION** pages.*

Accessed through the **NAVIGATION 4/4** Page (if AFIS is installed in the system, access is through the **NAVIGATION 4/5** Page) by pressing the Line Select Key corresponding to the VLF sensor, then pressing **ENT.**

VLF SUBSECTION 1/4 (Page 1 of 4)

POS:

Same as on **NAVIGATION 4/4.**

VLF:

The actual position computed by the sensor, when in the NAV mode. (Figure 2-25)

DIF:

The difference between the composite position and the sensor computed position in degrees, minutes and hundredths. (Figure 2-25)

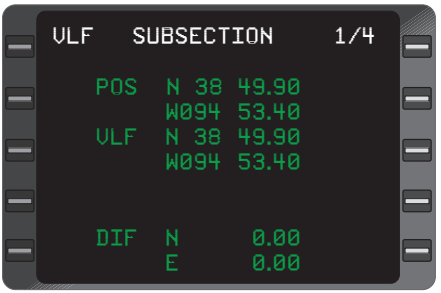


Figure 2-25

VLF SUBSECTION 2/4 (Page 2 of 4)

Pressing the **NXT** Key will display the second **VLF SUBSECTION** Page and the following can be observed.

QUALITY:

Quality Factor is a numerical display that indicates the reliability of position data and determines the weight of the VLF/Omega Sensor input to the composite position. The number will range from 2 to 7 (with 2 being optimum) in the primary navigation mode, and from 8 to 99 in the dead reckoning mode (**DR**). **NO STD** will be displayed if the rubidium frequency standard in the RPU is unstable. (Figure 2-26)

DR#:

The number of times the VLF/Omega Sensor has been in **DR** since first entering the **VLF** (primary) navigation mode. This information is not displayed if the system has never been in DR. (Figure 2-26)

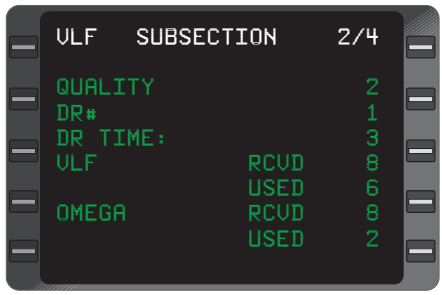


Figure 2-26

DR TIME:

The total number of minutes the VLF/Omega Sensor has been in **DR** since the operator last manually verified position. This information is not displayed if the system has never been in **DR**. (Figure 2-26)

VLF RCVD:

The number of U.S. Naval Communication stations being received by the VLF/Omega Sensor. (Figure 2-26)

USED:

The number of communication stations being used for navigation. (Figure 2-26)

OMEGA RCVD:

The number of Omega stations being received by the VLF/Omega Sensor. (Figure 2-26)

USED:

The number of Omega stations being used for navigation. (Figure 2-26)

NOTE: A maximum of eight stations in any combination can be used for navigation.

VLF SUBSECTION 3/4 (Page 3 of 4)

Pressing the **NXT** Key again will display the third **VLF SUBSECTION** Page and the following can be observed.

Column 1: (Figure 2-27) VLF COMM Stations

- WSH: Jim Creek, Washington
- AUS: Northwest Cape, Australia
- ANT: Anthorne, England
- MNE: Cutler, Maine
- HAW: Lualualei, Hawaii
- JPN: Yosami, Japan
- GBR: Rugby, England or
- ANN: Annapolis, Maryland

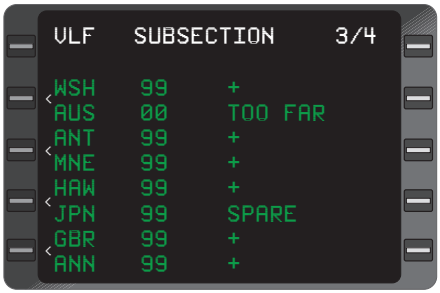


Figure 2-27

Column 2:

The station amplitude ranging from 01 (minimum acceptable) to 99 (maximum strength). Dashes (-) indicate the station amplitude is less than the minimum acceptable. (Figure 2-27)

Column 3: Status Messages. (Figure 2-27)

+: The station is being used for navigation.

-: The station is weak or unacquired.

TOO FAR:

The station is not used because of its distance from the aircraft position.

SPARE:

The station is acquired and acceptable but is not needed for navigation.

DESELECT:

The station has been manually deselected.

CUTOUT:

The station has been eliminated from use because its position determining information is unacceptable.

UNSTABLE:

The station has sufficient amplitude for use but has not passed the stability test.

FAILED:

The computer has detected a failure in the receiver assigned to that station. A message indicating a VLF/OMEGA receiver has failed will be displayed on the sensor messages page as **RCVR FAIL**

VLF SUBSECTION 4/4 (Page 4 of 4)

Pressing the **NXT** Key again will display the fourth **VLF SUBSECTION** Page and the following can be observed.

Column 1: (Figure 2-28) OMEGA Stations

- NOR: Aldra, Norway
- LIB: Liberia, Africa
- HAW: Haiku, Hawaii
- DAK: LeMoure, N. Dakota
- REN: Reunion Island, Indian Ocean
- ARG: Gulfo Nuevo, Argentina
- AUS: Darriman, Australia
- JPN: Tsushima, Japan

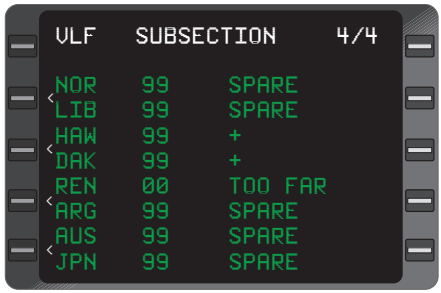


Figure 2-28

Columns 2 and 3:

Same as **VLF SUBSECTION 3/4.**

IRS/INS SUBSECTION PAGES

IRS (or INS) SUBSECTION 1/2 (Page 1 of 2)

POS:

The position in this field is the same as **POS** on **NAVIGATION 4/4.** (Figure 2-29)

IRS/INS:

The actual position computed by the specified sensor when in NAV mode. (Figure 2-29)

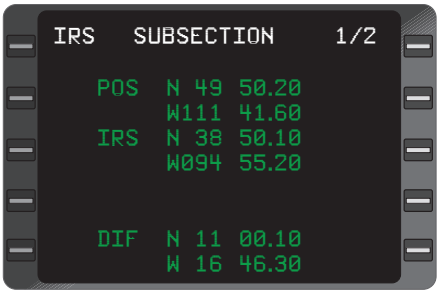


Figure 2-29

DIF:

The difference between the composite position and the sensor computed position in degrees, minutes, and hundredths. (Figure 2-29)

IRS SUBSECTION 2/2 (Page 2 of 2)

TIME TO NAV:

The time remaining until alignment is complete. (Figure 2-30)

CURRENT MODE:

This field annunciates the current mode of the IRS. The messages that can appear are **ATTITUDE, ALIGN,** or **NAV.** (Figure 2-30)

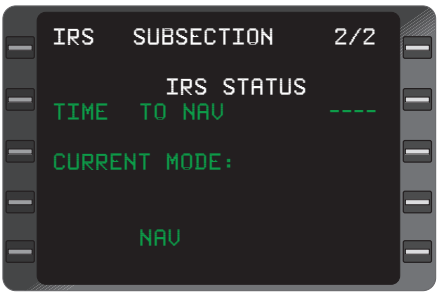


Figure 2-30

NOTE: Page 2 is only displayed with an IRS.

VPU SUBSECTION PAGES

Accessed through the **NAVIGATION 4/4** Page (if AFIS is installed in the system, access is through the **NAVIGATION 4/5** Page) by pressing the Line Select Key corresponding to the VPU sensor, then pressing **ENT**.

VPU SUBSECTION 1/4 (Page 1 of 4)

POS:

The position in this field is the same as **POS** on **NAVIGATION 4/4.** (Figure 2-31)

VPU:

The actual position computed by the sensor, when in the NAV mode. (Figure 2-31)

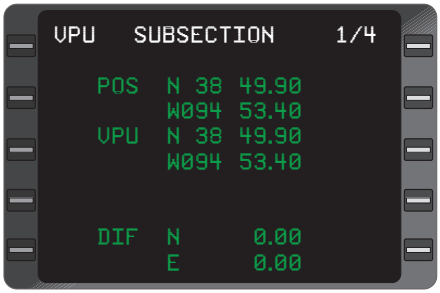


Figure 2-31

DIF:

The difference between the composite position and the sensor computed position in degrees, minutes and hundredths. (Figure 2-31)

VPU SUBSECTION 2/4 (Page 2 of 4)

Pressing the **NXT** Key again will display the second **VPU SUBSECTION** Page and the following can be observed.

QUALITY:

The numerical display in this field indicates the reliability of the position data from the VPU. The number will range from 2 to 99 (with 2 being optimum and 99 as dead reckoning). (Figure 2-32)

ADVISE IF>:

This field is an enterable field in which the operator may input a quality factor value from 2 to 98. If the VPU **QUALITY** exceeds this value a message is displayed on **SENSOR MESSAGES** Page. (Figure 2-32)

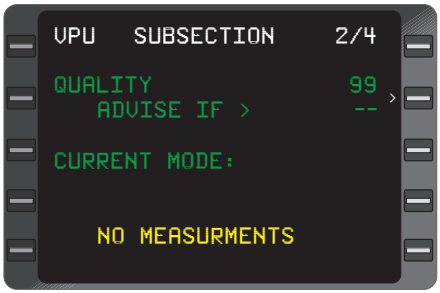


Figure 2-32

*NOTE: Entering 99 in this field will eliminate any previously entered value and no **CHECK QUALITY** message will appear.*

CURRENT MODE: Indicates the current mode of VPU navigation. The messages that can appear under it: (Figure 2-32)

- **NO MEASUREMENTS** indicates that VPU is not receiving valid data for navigation.
- **VOR/DME** indicates that distance and bearing (rho/theta) information is used to generate VPU position.
- **DME/DME** indicates distance (rho/rho) data is received and used to generate VPU position.
- **BAD GEOMETRY** indicates that station geometry is inadequate for navigation.

NAV 1 - CONFLICT or **NAV 2 - CONFLICT:**

The VPU is not using a manually or keyboard tuned station because of a possible station frequency conflict within the aircraft's current line-of-sight. (Figure 2-32)

VPU SUBSECTION 3/4 (Page 3 of 4)

Pressing the **NXT** Key again will display the third **VPU SUBSECTION** Page and the following can be observed.

VPU Sensor With Single Channel DME Inputs (Figure 2-33)

NAV 1 and NAV 2:

The station identifier and frequency being used for navigation.

RNG:

The range in nautical miles and tenths from aircraft present position to the DME station.

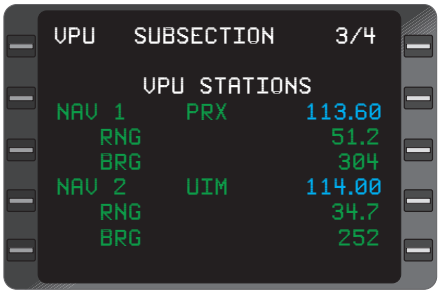


Figure 2-33

BRG:

Bearing in whole degrees from aircraft present position to the VOR.

VPU with Multiple Channel DME Inputs (Figure 2-34)

NAV 1:

The stations received by the NAV 1 VOR/DME receivers. The station identifier is shown adjacent to the field with the ACTIVE frequency.

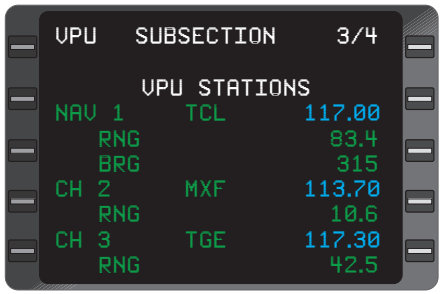


Figure 2-34

RNG:

Same as above.

BRG:

Same as above.

CH 2:

The station identifier and frequency for an additional station that the multiple channel DME is receiving. This frequency may or may not be displayed on the control head.

RNG:

The range in nautical miles and tenths from the aircraft's present position to the Channel 2 DME station.

CH 3:

The station identifier and frequency for the third station that is being received. This frequency is not displayed on the control head, and is automatically tuned by the system.

RNG:

Same as for CH 2.

*NOTE: When the DM441B DME, dedicated DM441B, or dedicated DME42 is configured, the **VPU SUBSECTION 3/4** page is different. The bearing information is suppressed and DME is annunciated instead of NAV.*

VPU SUBSECTION 4/4 (Page 4 of 4)

Pressing the **NXT** Key again will display the fourth VPU SUBSECTION Page and the following can be observed. If the VPU has multiple channel DME inputs **VPU SUBSECTION 4/4** appears and displays NAV 2 data. The page appears the same as **VPU SUBSECTION 3/4.**

GPS SUBSECTION PAGES

Accessed through the **NAVIGATION 4/4** Page (if AFIS is installed in the system, access is through the **NAVIGATION 4/5** Page) by pressing the Line Select Key corresponding to the GPS sensor, then pressing **ENT.**

GPS SUBSECTION 1/3 (Page 1 of 3)

See Figure 2-35.

POS:

The current composite position (latitude and longitude) computed in degrees, minutes, and hundredths of minutes.

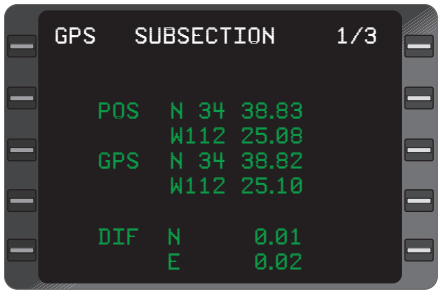


Figure 2-35

GPS:

The current GPS position. This information is only displayed when GPS is in the NAV mode.

DIF:

The difference between the composite position and sensor computed position in degrees, minutes and hundredths.

GPS SUBSECTION 2/3 (Page 2 of 3)

Pressing the **NEXT** Key will display the second **GPS SUBSECTION** Page and the following can be observed. See Figure 2-36.

HPE:

Horizontal Position Error displayed in nautical miles as a measure of GPS accuracy.

POS UNCERT:

Estimated Position Uncertainty, in nautical miles, when GPS is in navigation mode.

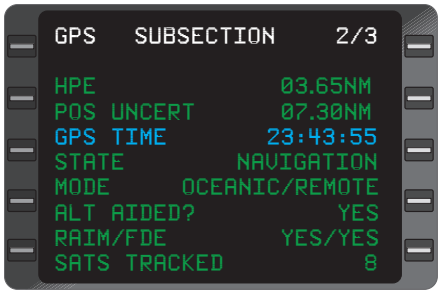


Figure 2-36

GPS TIME:

GPS time in hours, minutes and seconds. The advisory time is displayed when at least one satellite is being tracked, other-wise the time field displays dashes.

NOTE: GPS TIME may vary several seconds from GMT due to leap second input of UTC.

STATE: The GPS receiver state can be one of the following:

Dashes: Idle or no mode data.

INITIALIZE: The receiver is updated with initial position and time information.

SKY SEARCH: No almanac is available. The system searches for any satellite in the visible table based on the internal or external time, data, and position and then assigns channels in order received.

ACQUISITION: Constellation selection and channel assignments are being done. Carrier and code lock are in progress.

TRANSITION: The receiver is transitioning from one state, such as **ACQUISITION,** to another state, such as **NAVIGATION.**

NAVIGATION: The GPS receiver is in navigation mode and has at least a two dimensional position fix.

DR: The system is in dead reckon mode. When the position is valid and sufficient satellite measurements are unavailable, the receiver will continue to output valid position for a maximum of 30 seconds while using the last known velocity and track information. The position is invalid after 30 seconds.

MODE:

Possible receiver modes are **ENROUTE, OCEANIC/REMOTE**, **TERMINAL,** and **APPROACH.** These modes are used to determine what accuracy parameters should be used for a particular phase of flight.

ALT AIDED?:

Indicates the GPS receiver is using an externally supplied altitude input for position calculation.

RAIM/FDE?:

Indicates **RAIM** and/or **FDE** is **AVAIL**able or **UNAVAIL**able.

SATS TRACKED:

Indicates the number satellites presently being tracked.

GPS SUBSECTION 3/3 (Page 3 of 3)

Pressing the **NXT** Key again will display the third **GPS SUBSECTION** Page and the following can be observed.

This page displays the GPS receiver status. The GPS receiver is an 8 channel receiver, therefore, up to 8 lines of satellite information is displayed. The information displayed is as follows: (Figure 2-37)

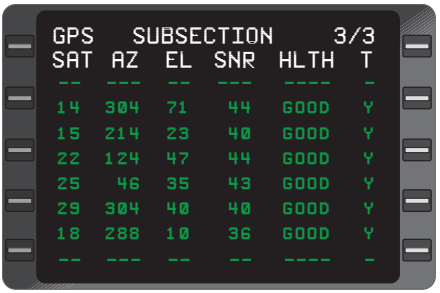


Figure 2-37

GPS SAT:

This is the satellite (PRN) number.

AZ:

This is the satellite azimuth position displayed in degrees.

EL:

Satellite elevation displayed in degrees above the horizon.

SNR:

This the received signal-to-noise ratio for each satellite.

HLTH:

Satellite health is displayed as **BAD** or **GOOD.**

T:

YES or **NO** displayed as to whether this satellite is presently being tracked.

VERTICAL NAVIGATION SECTION (VNAV KEY)

Upon pressing the **VNAV** Key the **VNAV 1/3** Page will be displayed and the following can be observed.

VNAV PAGES

NOTE: AFIS flight plans do not support any altitudes, including airport elevation. As a result no altitude constraints will be provided for SIDS, STARS or Approaches. If the airport, SIDs, STARS or Approaches are obtained from the database altitudes will be provided.

In some programmed approaches, the altitude associated with the MAP waypoint is computed from the FAF through the MAP waypoint to a point 50 feet above the runway threshold. MDA may be reached prior to the MAP waypoint. The MDA must be observed if the runway is not in sight.

VNAV 1/3 (Page 1 of 3)

VNAV MODE:

Mode required to fly to the vertical TO waypoint and Baro Altitude in feet. Can display one of the following:

• **INVALID:** Indicates **VNAV** function is invalid. In order to be set valid the following must be met:

1. Air Data valid (baro altitude and altitude rate)

2. Valid lateral TO Waypoint

3. Valid vertical TO waypoint

4. NO SXTK programmed

5. Crosstrack **(XTK)** < 12.5NM

• **INACTIVE:** VNAV system is not activated because non-volatile memory was erased during software update or it was manually set inactive before shutdown. Pressing the **BACK** Key with the cursor over the inactive field can display one of the following:

NOTE: When VNAV Mode is inactive, all external VNAV outputs are disabled, including VERT DEV, EFIS altitude constraints at waypoints and VNAV WPT ALERT annunciation.

• **CLIMB:** Indicates climb required to cruise altitude or to next altitude restriction. (Figure 2-38)

• **CRUISE:** Indicates holding altitude while enroute to Top of Descent **(#TOD)** point. (Figure 2-39)

• **PATH DESCENT:** Indicates descent via programmed Flight Path Angle. Vertical Deviation will be enabled on the Vertical Deviation needle and the **VERT DEV** field is active. The VERT DEV field will not be displayed if there is no vertical path programmed. (Figure 2-40)

• **DESCENT:** Indicates non-path or Air Mass descent to altitude restriction.

• **LEVEL:** Indicates aircraft should fly level to next constraint.

TO Waypoint:

Vertical **TO** waypoint with constraint altitude and applicable waypoint offset. Letters preceding or following the altitude constraint have the following meaning: **FL**=Flight Level, **A**=At or Above, **B**=At or Below, **G**=Glide Path, and a blank space=At constraint.

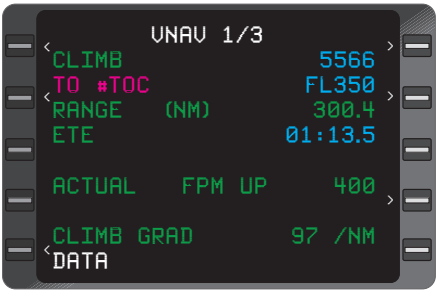


Figure 2-38

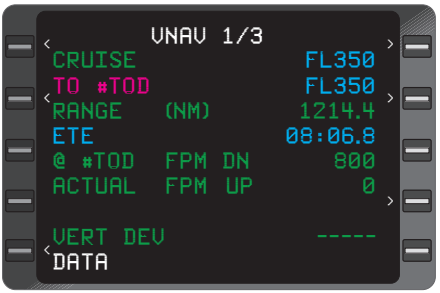


Figure 2-39

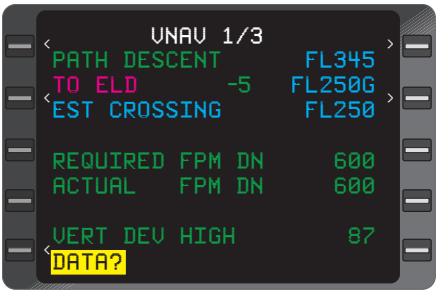


Figure 2-40

One of the following system generated VNAV profile points may also appear as the **TO** waypoint:

• **#TOC:** Indicates the Top of Climb target altitude. This point becomes the Vertical TO Waypoint once the aircraft has passed the final climb constraint waypoint and is climbing. (Figure 2-40)

• **#TOD:** Indicates the Top of Descent target altitude where the aircraft should begin its descent in order to arrive at the Descent Reference Waypoint at the required altitude. (Figure 2-39)

*NOTE: If no Descent Reference Waypoint with crossing altitude is programmed, the system will use the arrival airport elevation to fix the **#TOD** as long as an airport is the last waypoint on the Active FPL.*

EST CROSSING:

Altitude trajectory computed by the system to the Vertical **TO** waypoint based on current groundspeed and vertical speed (Figure 2-40). This field will display **RANGE (NM)** in miles and tenths when the Vertical **TO** Waypoint is a **#TOD** or **#TOC** profile point. (Figure 2-39)

ETE:

The estimated time enroute in hours, minutes and tenths, from the aircraft present position to the Vertical **TO** Waypoint, **#TOC** or **#TOD**. (Figure 2-39)

REQUIRED FPM:

Required vertical speed in feet per minute to make the altitude constraint based on current ground speed. **UP** indicates a positive vertical speed and **DN** indicates a negative vertical speed (Figure 2-40). This field will display **@#TOD FPM DN** when the Vertical **TO** Waypoint is the Top of Descent and indicate the descent target vertical speed. (Figure 2-39)

ACTUAL FPM:

Actual vertical speed in feet per minute. **UP** indicates a positive vertical speed and **DN** indicates a negative vertical speed. (Figures 2-39 and 2-40)

VERT DEV:

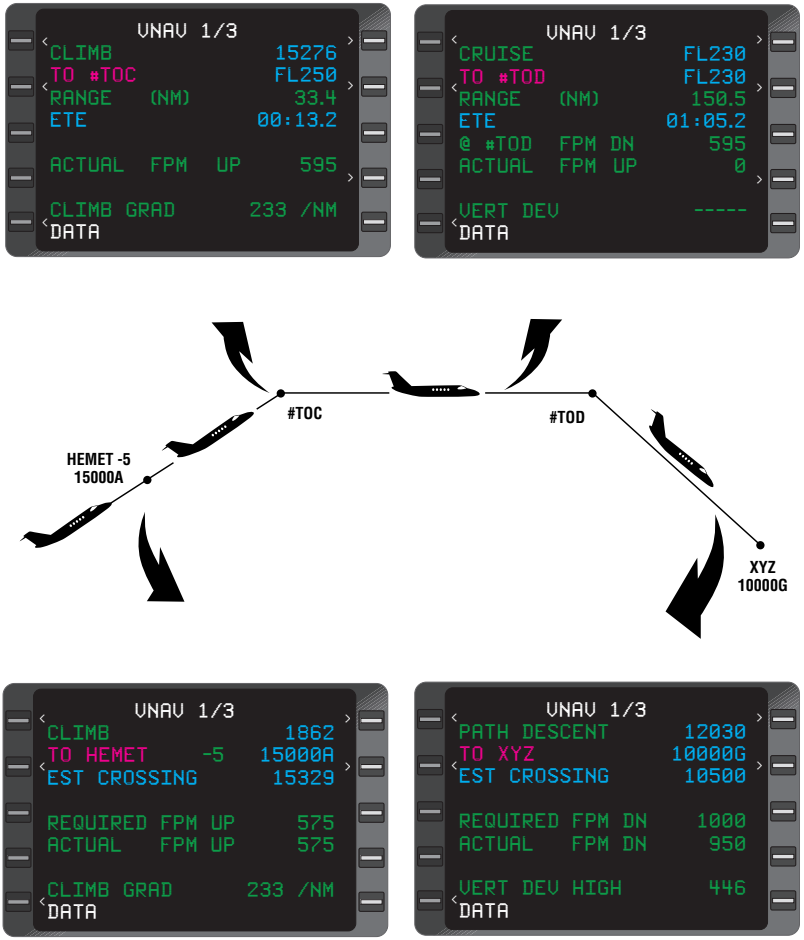
Vertical deviation of aircraft from this descent path in feet. **HIGH** indicates aircraft is above the path (Figure 2-40); **LOW** indicates aircraft is below path. **CLIMB GRAD xxx/NM** is displayed during **CLIMB** mode to indicate current aircraft climb performance in feet per nautical mile. (Figure 2-38)

*NOTE: **VERT DEV** data field is dashes if the **ETE** to descent path intercept is greater than one minute. This line will be blank if no FPA is programmed at descent reference waypoint. In this case **#TOD** will be determined using the default FPA from the **VNAV DATA** Page. However the FPA must still be entered for the system to provide a path.*

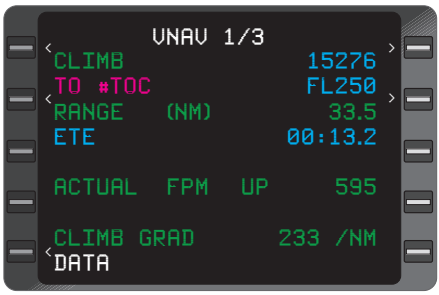
DATA:

A prompt to access the **VNAV DATA** Page, by placing the cursor over the **DATA** field and pressing the **ENT** Key. (Figure 2-40)

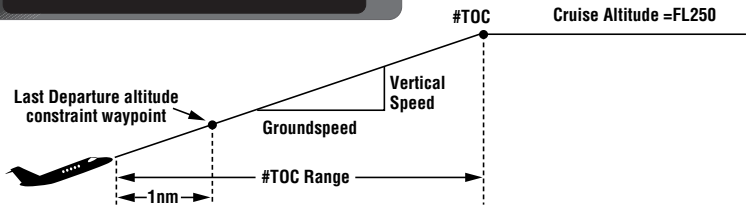
Figures 2-41 and 2-42 further illustrate the meanings of the fields on **VNAV** Page 1.



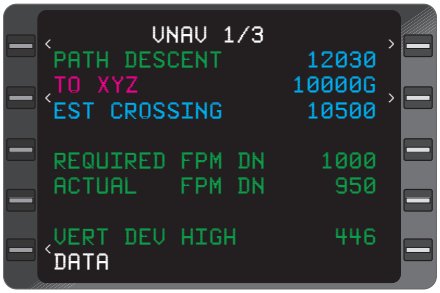
Progression of Vertical Waypoints from Climb to Path Decent on VNAV 1/1
Figure 2-41



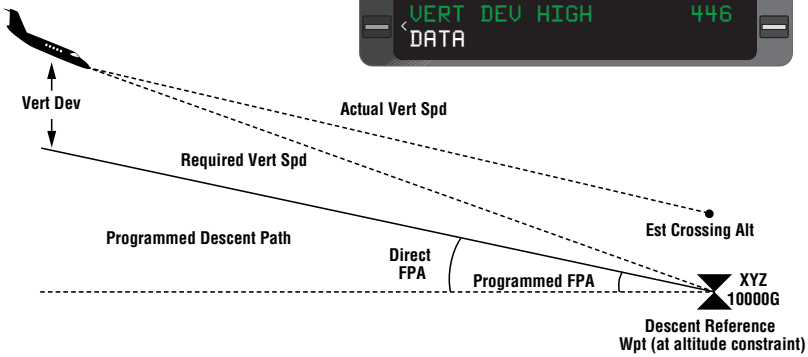
CLIMB



NOTE: Top of Climb appears as a Vertical Waypoint on the VNAV FPL Page when the aircraft is within 1 NM of the last departure waypoint that has an altitude constraint programmed



DESCENT



Definition of Climb and Decent on VNAV 1/1
Figure 2-42

VNAV 2/3 (Page 2 of 3) - FLIGHT PLAN WayPoint

Pressing the **VNAV** Key will display the second VNAV Page and the following can be observed.

VNAV MODE: Mode required to fly to the vertical TO waypoint and Baro Altitude in feet. Can display one of the following:

- **INVALID:** Same as on **VNAV 1/1.**
- **INACTIVE:** Same as on **VNAV 1/1.**
- **CLIMB:** Same as on **VNAV 1/1.**
- **CRUISE:** Same as on **VNAV 1/1.**
- **PATH DESCENT:** Same as on **VNAV 1/1.**
- **DESCENT:** Same as on **VNAV 1/1.**
- **LEVEL:** Same as on **VNAV 1/1.**

WAYPOINTS:

Lateral and Vertical waypoints listed in order of occurrence with respect to the vertical profile, with constraint altitude and applicable waypoint offset, where **FL**=Flight Level, **A**= At or Above, **B**=At or Below, **G**=Glide Path, and a blank space=At constraint. (Figure 2-43)

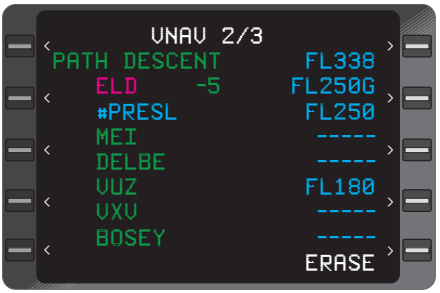


Figure 2-43

One of the following system generated VNAV profile points may also appear:

- **#TOC:** Indicates the Top of Climb target altitude.
- **#TOD:** Indicates the Top of Descent target altitude. (Figure 2-44)

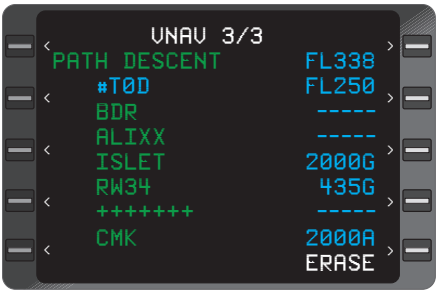


Figure 2-44

• **#PRESL:** Indicates the estimated position where the aircraft will arrive at the altitude shown on the Altitude Pre-Selector. Field does not appear unless the system is configured for an altitude preselector and the aircraft is flying toward this altitude. (Figure 2-44)

++++++ :

A discontinuity in the flight plan that separates the missed approach waypoint from the rest of the approach. (Figure 2-43) No Auto Leg change will occur beyond this point.

WAYPOINT IDENTIFIERS:

May consist of from one to six alphanumeric characters. If more identifiers are present than can be listed on this page, subsequent pages will list the remaining waypoints. (Figure 2-45)

*NOTE: Waypoints cannot be added to the active flight plan from the VNAV section. Enter new waypoints on **ACTIVE FLIGHT PLAN** Page.*



Figure 2-45

ERASE:

Used to erase all altitude constraints, except the altitude constraint at the current lateral **TO** Waypoint.

VNAV DATA 1/1 (Page 1 of 1)

*NOTE: This page is accessed by using the Line Select Key to place the cursor over the **DATA** prompt on **VNAV** Page 1/X and pressing **ENT** Key.*

CRUISE ALT:

Manually entered cruise altitude in feet or Flight Level (FL). Any altitude entered greater than the transition level is converted and displayed as flight level (rounded off to the nearest hundred feet). An altitude less than 1000 feet must be entered with a preceding zero. (Figure 2-46)

*NOTE: In a climb, when the aircraft is within 200ft of the Preselect Altitude, the **CRUISE ALT** changes to the same value as the **PRESEL ALT**.*

The field also goes to dashes during a descent (digital systems only) when the aircraft is 200ft lower than the **CRUISE ALT** and the Preselect is set to a lower value. If the **PRESEL** is analog the altitude value will remain in the **CRUISE ALT** field. When the aircraft is within 200ft of the **PRESEL ALT** the **CRUISE ALT** changes again to the same value as the **PRESEL ALT**.

TRANS LEVEL:

Transition Level used to determine the altitude at which the system converts altitudes to Flight Levels. This field defaults to **FL180** if the pilot does not enter a value. (Figure 2-46)

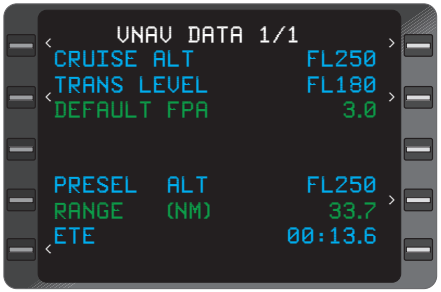


Figure 2-46

DEFAULT FPA:

The FPA defaults to the 3.0 unless it is manually entered. The default descent Flight Path Angle can be manually entered in degrees and tenths (0.1 to 6.0 range) (Figure 2-46). **DEFAULT FPA** is used to calculate **#TOD** to the first altitude constraint on the Active Flight Plan. However an FPA must be entered on the VNAV waypoint page to establish a **PATH DESCENT** and for Vert Dev or vertical deviations to be valid.

NOTE: Pilot enters numbers only, as the decimal point (.) prefills as a default.

PRESEL ALT:

If configured, Preselected Altitude input from system, in feet or Flight Level. (Figure 2-46)

*NOTE: An analog type preselector only displays **PRESEL ALT** when the aircraft is within 1000ft of actual altitude.*

RANGE (NM):

If configured, Range to Pre-selected Altitude in nautical miles and tenths (0.0 to 999.9 range). (Figure 2-46)

ETE:

If configured, the estimated time enroute to the Pre-selected Altitude in hours, minutes and tenths. (Figure 2-46)

VNAV WAYPOINT 1/1 (Page 1 of 1)

Accessed by placing the cursor over a lateral WPT and pressing the **VNAV** Key or by placing the cursor over a WPT in the VNAV section and pressing **ENTER** key.

WAYPOINT:

VNAV waypoint will consist of from one to six alphanumeric characters.

ALT:

Constraint altitude prefills from database or can be manually entered. Any altitude entered greater than the transition level (from the **VNAV DATA** Page) is converted and displayed as flight level rounded off to the nearest hundred feet. An altitude less than 1000 feet must be entered with a preceding zero. Altitudes below sea level are limited to -1000 feet. The following may appear in the altitude field:

- **FL:** Flight Level (Preceding the Altitude Value)
- **A:** At or Above (Following the Altitude Value)
- **B:** At or Below (Following the Altitude Value)
- **Blank space:** At (Following the Altitude Value)

NOTE: If the destination airport or runway is manually entered, or if the airport/runway is loaded from the database, the airport elevation will be displayed in the altitude field. If the flight plan is loaded through AFIS, the airport elevation will not be available.

EST CROSSING:

Altitude trajectory computed by the system to the Vertical **TO** Waypoint based on current groundspeed and Vertical speed. (Figure 2-47) This field is displayed for the active vertical waypoint.

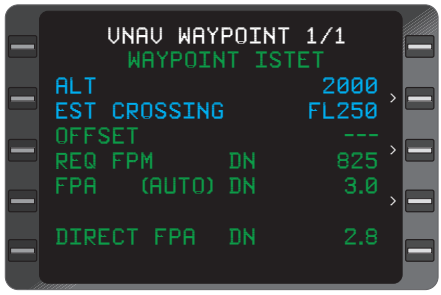


Figure 2-47

PLAN CROSSING:

System determined crossing based on programmed constraints and flight path angles for descent. (Figure 2-48) This field is displayed for other than the Active Vertical Waypoint and will be displayed in place of **EST CROSSING.**

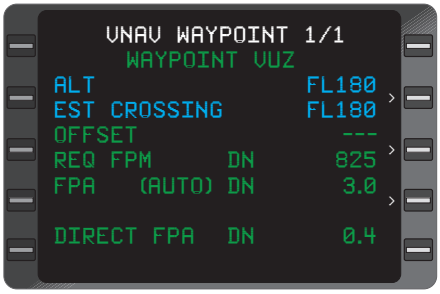


Figure 2-48

OFFSET:

Pilot entered value in nautical miles (-99 to +99 range) where a positive entry (+) indicates an offset beyond the waypoint and a negative (-) entry is prior to the waypoint.

NOTE: Pilot must enter the leading (+) sign for the offset to be beyond the fix, but a (-) prefills as a default to cross prior to the fix.

REQ FPM (Required Feet Per Minute):

Required vertical speed in feet per minute the aircraft must maintain to reach the Vertical waypoint. **UP** indicates a positive vertical speed and **DN** indicates a negative vertical speed is required.

*NOTE: If **PLAN CROSSING** is displayed, then the **REQ FPM** is the planned vertical speed for the waypoint. **REQ FPM** will be dashes if ground speed or air data is not valid.*

FPA (Flight Path Angle):

Flight Path Angle for path descent to waypoint in degrees and tenths with valid range 0.1 to 6.0. The following may appear in parentheses:

- **DB:** Indicates **FPA** from database.
- **MAN:** Indicates manually entered **FPA.**
- **DIR:** Indicates direct **FPA** programmed. (Figure 2-49)
- **AUTO:** Indicates system computed **FPA**.

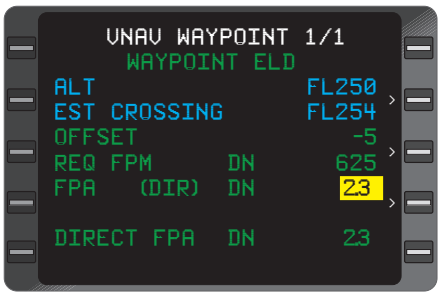


Figure 2-49

• **DEF:** Indicates **FPA** default from **VNAV DATA** Page.

*NOTE: **DIR, AUTO,** and **DEF** can be accessed using the **BACK** Key.*

DIRECT FPA:

Direct Flight Path Angle from the current aircraft altitude to the Vertical waypoint in degrees and tenths (valid range 0.0 to 90.0), where **DN** indicates negative **FPA** and **UP** indicates positive **FPA.**

AFIS SECTION (AFIS KEY)

Refer to Section 7 for description and operation of AFIS.

PLANNING SECTION (PLAN KEY)

Upon pressing the **PLAN** Key the **PLAN 1/8** Page will be displayed and the following can be observed.

PLAN PAGES

PLAN 1/8 (Page 1 of 8) FUEL STATUS

FUEL STATUS LB:

Indicates that fuel is being computed in pounds. This unit can be manually changed to **KG** if desired, using the **BACK** Key when the cursor is over the **LB** field. (Figure 2-50)

*NOTE: the cursor must first be placed over the remaining field so the **LB** field can be activated.*

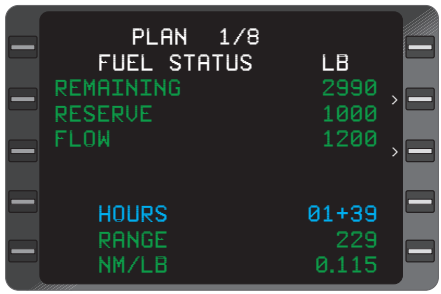


Figure 2-50

REMAINING:

The total fuel on board in pounds or kilograms. This quantity must be initially entered or verified by the pilot and may require periodic verification or update. (Figure 2-50)

RESERVE:

The desired reserve, as entered or verified by the operator, displayed in pounds or kilograms. This may require periodic verification or update. (Figure 2-50)

FLOW:

The current fuel flow in pounds or kilograms input automatically from fuel flow indicators. **(MAN)** indicates a pilot manual entry and the entry must be manually verified and periodically updated. (Figure 2-51)

*NOTE: The above three quantities will flash after 15 minutes and will require verification by using the Line Select and **ENT** Keys if **MAN** fuel flow was selected.*

VERIFY INPUTS:

Each of the flashing values must be verified or entered by pressing the **ENT** Key when the cursor is over each field. This field is only displayed after the system is turned on and will be displayed in place of the **LAST INPUT** field on line 6. (Figure 2-51)

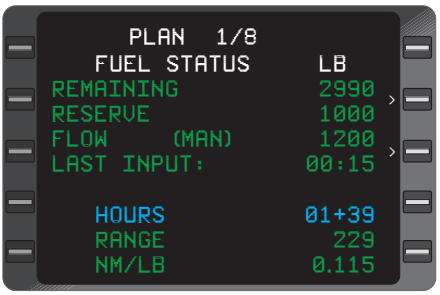


Figure 2-51

LAST INPUT:

The time in hours and minutes since the above three quantities were verified. This field only appears if fuel flow is input manually. (Figure 2-51)

*NOTE: This field displays **VERIFY INPUTS** at system turn-on since **REMAINING** and **RESERVE** are stored in non-volatile memory during system shut-down.*

HOURS:

The hours and minutes of fuel remaining until the reserve fuel quantity is reached. (Figure 2-50) Fuel flow and ground speed must be valid.

RANGE:

The nautical mile range available until the reserve fuel quantity is reached. (Figure 2-50) Fuel flow and ground speed must be valid.

NM/LB:

The number of nautical miles for each pound (or kilogram) of fuel consumed. (Figure 2-50)Fuel flow and ground speed must be valid.

PLAN 2/8 (Page 2 of 8) TRIP PLAN

Pressing the **PLAN** Key again will display the **PLAN 2/8** Page.

This page may be used to monitor the Active Flight Plan progress or a stored flight plan may be loaded on this page for planning purposes.

TRIP PLAN:

The flight plan selected will be designated by an **"A"** for the Active Flight Plan, a number (1 to 56) for a stored flight plan, or - - - dashes if no active Flight Plan is loaded. (Figure 2-52)



Figure 2-52

FR:

The **FROM** waypoint identifier is followed on the same line by the first waypoint (origin) on the selected flight plan (**KDAL**). The **FROM** waypoint is usually replaced by **DIRECT.** (Figure 2-52)

TO:

The **TO** waypoint identifier is followed on the same line by the last waypoint (destination) on the selected flight plan (**RW34**). (Figure 2-52)

GS:

The groundspeed in knots is input automatically when the groundspeed is valid or can be inserted manually which is indicated by **(MAN)**. The **GS** value, **(MAN)** and ETA value will change to yellow. **(CALC)** will replace **(MAN)** field if a manual ETA is entered on line 9. (Figure 2-52)

DIS/DTK:

The distance in nautical miles and tenths between either the **FROM** and **TO** waypoints or between the aircraft's present position and the **TO** waypoint. The desired track is the Great Circle course between the **FROM** and **TO** waypoints. The **DTK** will have a **T** adjacent to it if a true heading input is received or if the **FROM** waypoint is north N 70° or south S 60° latitude. (Figure 2-52)

ETE:

The estimated time enroute in hours, minutes and tenths of minutes between the aircraft's present position and the **TO** waypoint or the **FROM** and **TO** waypoints based on the **GS** value. (Figure 2-52)

FPL:

The total active or stored flight plan distance and time remaining via the Flight Planned route from the **FROM** waypoint, (or the aircraft's present position when a Direct To leg is displayed), to the last waypoint on the selected flight plan that precedes a "fence". Distance is displayed in whole miles and time is in hours and minutes. (Figure 2-52)

ETA @:

Estimated time of arrival at the destination, or last waypoint on the Active Flight Plan that precedes a "fence", appears when a **DIRECT TO** leg is displayed. (Figure 2-52)

*NOTE: The **ETA** value field will turn yellow if a ground speed is entered manually, indicating that the **ETA** is calculated based on the manual ground speed value. The **GS** field will turn yellow and **(CALC)** will be displayed if a manual ETA value is entered.*

RAIM @:

Receiver Autonomous Integrity Monitoring at the last flight plan waypoint will display **AVAIL** (available) or **NOT AVAIL** (not available) at the ETA. If a manual ground speed or ETA has been entered, **STANDB**Y will be displayed momentarily while the system calculates RAIM availability. If **GPS** is not functioning, **NO NAV** will be displayed.

PLAN 3/8 (Page 3 of 8) FUEL PLAN

Pressing the **FPL** Key again will display the **PLAN 3/8** Page.

FUEL PLAN:

The **"A"** indicates that Active Flight Plan information is being displayed. A numeric entry in the field provides fuel planning for stored flight plans. (Figure 2-53) Dashes are displayed if there is no active Flight Plan.

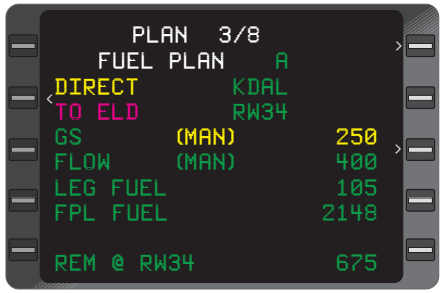


Figure 2-53

FR:

The **FROM** waypoint identifier is followed on the same line by the first waypoint (origin) on the selected flight plan. The **FROM** waypoint is usually replaced by **DIRECT.** (Figure 2-53)

TO:

The **TO** waypoint identifier is followed on the same line by the last waypoint (destination) on the selected flight plan. (Figure 2-53)

GS:

The ground speed in knots is input automatically when the ground-speed is valid or can be input manually, which is indicated by **(MAN). GS** value and **(MAN)** will be yellow. (Figure 2-53)

FLOW:

The fuel flow in pounds or kilograms is input automatically from fuel flow indicators/transmitters or can be inserted manually, which is indicated by **(MAN)**. (Figure 2-53)

LEG FUEL:

The amount of fuel in pounds (or kilograms) used on the current FROM/TO leg or from the aircraft's present position to the current **TO** waypoint, based on groundspeed, fuel flow and distance. (Figure 2-53)

FPL FUEL:

The total amount of fuel anticipated to be consumed to the last waypoint on the flight plan that precedes a "fence". This calculated value is based on the current fuel flow, groundspeed values and distance. (Figure 2-53)

REM @:

Appears only if a DIRECT TO leg is displayed. It indicates the amount of fuel remaining overhead at destination, or the last waypoint on the Flight Plan that precedes a "fence", under current conditions. This value is based on the **REMAINING** fuel quantity from the **FUEL STATUS** page minus the total FPL fuel (Figure 2-53). The entire **REM** @ field will turn yellow if the **REM** @ value is less than the programmed reserve on **PLAN 1/8** Page.

PLAN 4/8 (Page 4 of 8) FUEL FLOW

Pressing the **FPL** Key again will display the **PLAN 4/8** Page.

ENGINE:

The fuel flow, in pounds or kilograms per hour, for each engine as taken from the fuel flow indication system. the number of engines shown will depend on system configuration. (Figure 2-54).

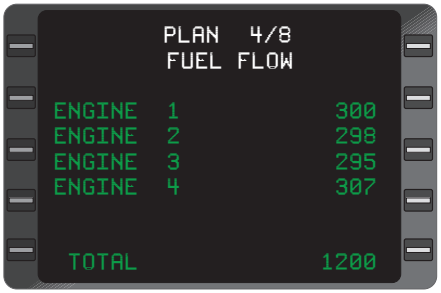


Figure 2-54

TOTAL:

The total fuel flow, in pounds or kilograms per hour, from all engines. (Figure 2-54)

NOTE: This page will appear only if the system is configured for automatic fuel flow and the individual engine fuel flow is available.

PLAN 5/8 (Page 5 of 8) DATE/GMT

Pressing the **PLAN** Key again will display the **PLAN 5/8** Page.

DATE:

Same as the Initialization Page.

GMT:

Same as the Initialization Page.

*NOTE: If necessary, both **DATE** and **GMT** can be corrected on this page but the takeoff and time values will be affected.*

TAKEOFF:

The **GMT** at weight-off-wheels plus 10 seconds. (Figure 2-55)

LAND:

The **GMT** at weight-on-wheels. This field is not displayed until weight-on-wheels plus 10 seconds occurs. (Figure 2-55)



Figure 2-55

*NOTE: **TAKEOFF** and **LAND** times may be based on groundspeed and/or TAS valids depending upon system configuration.*

FLIGHT TIME:

The elapsed flight time is displayed in hours and minutes. (Figure 2-55)

PLAN 6/8 (Page 6 of 8) AIRCRAFT WEIGHT

Pressing the **PLAN** Key again will display the **PLAN 6/8** Page.

BASIC OP WT:

The combined weight in pounds or kilograms of the empty aircraft, crew members, and crew baggage. (Figure 2-56)



Figure 2-56

PAYLOAD:

Weight in pounds or kilograms of passengers, cargo, and baggage

(excluding crew). (Figure 2-56)

FUEL ON BOARD:

Weight in pounds or kilograms of fuel on board. (Figure 2-56)

VERIFY INPUTS:

Each of the flashing values must be verified or entered by pressing the **ENT** Key when the cursor is over each field. This field is displayed only after system turn on.

VERIFY FUEL:

This is displayed in the same field as **VERIFY INPUTS** if a manual fuel flow has been entered and has not been verified for 15 minutes or more.

FUEL USED:

If configured for Automatic Fuel Flow, the weight in pounds or kilograms of fuel consumed. (Figure 2-56)

NOTE: This field appears as dashes at power up and increments as auto fuel flow data is available.

GROSS WT:

The total weight in pounds or kilograms of basic operating weight, payload and fuel on board displayed after all values have been entered. (Figure 2-56)

PLAN 7/8 (Page 7 of 8) FDE Prediction

Pressing the **PLAN** Key again will display the **PLAN 7/8** Page. This page is used if GPS will be the sole navigation source in Oceanic/Remote operation. The following information is entered to make the necessary FDE prediction to determine sufficient satellite availability, integrity, and accuracy. All entries made on this page will remain until changed or the system is powered down. See Figure 2-57.

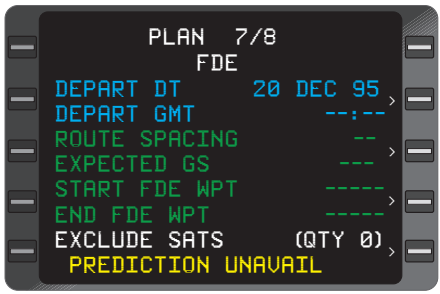


Figure 2-57

DEPART DT:

Date for which FDE prediction is to be calculated.

DEPART GMT:

Time for which FDE prediction is to be calculated.

ROUTE SPACING:

Centerline to centerline route spacing of segment for which FDE is being calculated. 1 to 99 nautical miles may be entered. 60NM is a normal entry.

EXPECTED GS:

Estimated ground speed for the route segment. A value of 100 to 999 may be entered.

START FDE WPT:

First waypoint on the Oceanic/Remote route segment. Placing the cursor over this field allows waypoint entry. Pressing the **BACK** Key will cycle through the waypoints on the active flight plan. Dashes are displayed prior to the last waypoint on the flight plan. Pressing **ENT** while the dashes are displayed will clear the start and end waypoints, resulting in an undefined Oceanic/Remote segment.

END FDE WPT:

Last waypoint in the Oceanic/Remote route segment. The **BACK** and dashes operate the same here as in the **START FDE WPT** field.

EXCLUDE SATS (QTY x):

Displays the number of satellites currently being excluded from the FDE prediction. Up to seven satellites may be excluded at a given time. When the cursor is placed over this field and **ENT** is pressed, the **FDE EXCLUDE SATS 1/1** Page will be displayed. See Figure 2-58



Figure 2-58

ENTRY REQUIRED:

This is displayed If the aircraft is on the ground and not all the data has been entered. The following is a list of the other possible messages displayed in this field:

• **START CALC? ENT**: This is displayed when the aircraft is on the ground and all data has been entered. Pressing **ENT** will start the FDE calculation and display **PLAN 7/8 FDE COMPUTATION**. See Figure 2-59

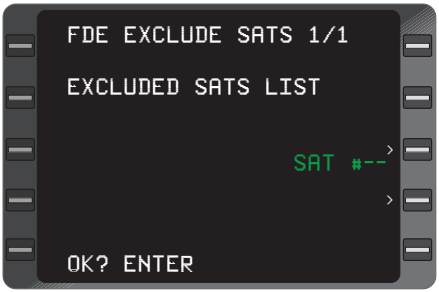


Figure 2-59

• **NEED ACTIVE FPL**: This will be displayed if there are less than two waypoints on the active flight plan.

• **BACK FOR NEXT WPT**: Displayed when the cursor is over the start or end waypoint field.

• **PRED IN PROGRESS**: This is displayed when an FDE prediction is in progress. All other fields are disabled at this point.

• **PREDICTION UNAVAIL**: This will be displayed if the GPS is not in the idle state or the aircraft is not on the ground.

FDE EXCLUDE SATS 1/1 (Page 1 of 1)

This page is accessed by placing the cursor over the **EXCLUDE SATS (QTY x)** field on **PLAN 7/8** Page and pressing **ENT**.

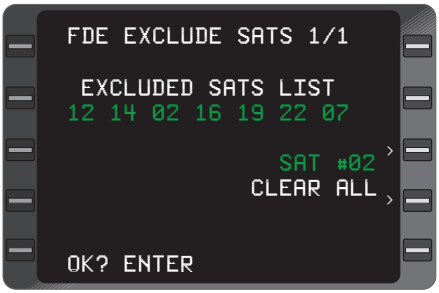


Figure 2-60

EXCLUDE SATS LIST:

The designated satellite number being excluded from the FDE prediction is listed here.

SAT #:

The desired satellite being excluded from FDE prediction is entered by pressing the Line Select Key by this field and entering the number of the satellite. Press **ENT** to add the satellite to the list. Entering a number already listed and pressing **ENT** will remove the number from the list. Pressing the Line Select Key next to **CLEAR ALL** and pressing **ENT** will remove all satellites from the exclusion list.

PLAN 8/8 (Page 8 of 8) FDE COMPUTATION

COMPUTING - STANDBY:

This display will flash while FDE prediction is being calculated. See Figures 2-61



Figure 2-61

xx% COMPLETE:

The number displayed is the percentage of calculation completed.

When the FDE prediction is complete, the system will display either FDE and NAV are available or unavailable. Normal calculation time is from ten to twenty minutes. See Figures 2-62 and 2-63.



Figure 2-62



Figure 2-63

HEADING SECTION (HDG KEY)

Upon pressing the **HDG** Key the **HEADING VECTOR 1/1** Page will be displayed and the following can be observed.

HEADING PAGE

HEADING VECTOR 1/1 (Page 1 of 1)

HDG:



Figure 2-64

Commanded heading in whole degrees. This field may also prefill with current aircraft heading if heading is valid. Pilot may manually enter heading preceded by a turn direction **R** or **L**. A **T** indicates the system is operating in the true heading mode. After a heading entry is made and the **ENT** Key is pressed, the cursor will move to the Heading Mode field and **HDG SELECT?** will be displayed.

HEADING MODE:

Use **BACK** Key to select one of the following:

• **INTERCEPT:** indicates Heading Mode is **ON** and will intercept next leg of the flight plan if the remaining fields are verified or entered. (Figure 2-65)

• **CANCEL:** indicates Heading Mode is **OFF**.

• **HDG SELECT:** indicates Heading Mode is **ON,** but no intercept.

*NOTE: If any of the mode words are followed by a **?** the mode is not active. The **ENT** key must be pressed to activate the mode.*

TO WAYPOINT:

Prefills with current **TO** Waypoint or is enterable (from one to six alphanumeric characters). (Figure 2-65)



Figure 2-65

*NOTE: With the cursor over the **TO** Waypoint field, using the **BACK** Key will step through to the end of the Active Flight Plan waypoints. The system will identify an IAF, ARC, PT, HP, FCF, FAF or MAP waypoint above the TO Waypoint field.*

DTK:

Desired track is the Great Circle course in whole degrees between the **FROM** and **TO** waypoints from Navigation Page 1. (Figure 2-65) If the system is displaying Direct **TO** a waypoint, the **DTK** will be from present position to the current **TO** waypoint.

*NOTE: If the default desired track is changed, a Pseudo Vortac (selected course) leg will be programmed on the **NAVIGATION 1/4** Page.*

INTERCEPT Messages:

If the Intercept Mode is programmed one of the following messages may appear. (Figure 2-65)

• **INTERCEPT BEYOND FIX** indicates the commanded heading will cause the aircraft to intercept the programmed course on the FROM side of the fix.

• **NO COURSE INTERCEPT** indicates the commanded heading will cause the aircraft to diverge from the programmed course (crosstrack deviation will increase).

• No Message indicates an intercept is not programmed, or the commanded heading will intercept the programmed course prior to the fix. (The **TO** side of the fix)

• **NO ARC INTERCEPT** indicates commanded heading will not intercept the arc programmed on the approach procedure.

OK? ENT:

The procedure for accepting the entered heading, **TO** waypoint or **DTK** is to depress the **ENT** Key. (Figure 2-65)

TUNING SECTION (TUNE KEY)

Upon pressing the **TUNE** Key the **TUNE 1/4** Page will be displayed and the following can be observed.

TUNING PAGES

TUNE 1/4 (Page 1 of 4) COMM

NOTE: If the system is configured for two or less communications radios, the tune section will display only three pages.

COMM 1 or **COMM 2:**

The information for each Comm radio. (Figure 2-66)

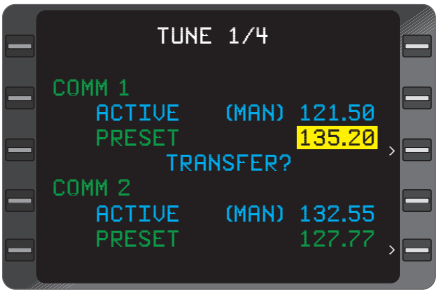


Figure 2-66

ACTIVE:

NOTE: If the frequency currently tuned and displayed on the respective control head, appears briefly but turns to dashes, the system interface does not provide a return frequency input.

(MAN) in this field indicates the frequency was manually entered via the control head (Figure 2-66). If the **(MAN)** field is blank, the system was tuned via the CDU keyboard.

PRESET:

The pilot can enter and store a frequency in this field through the keyboard. (Figure 2-66)

TRANSFER?:

The displayed **PRESET** frequency can be transferred to **ACTIVE** when the **ENT** key is depressed. The control head will reflect this change. (Figure 2-66)

TUNE 2/4 (Page 2 of 4) COMM

The same information from the first page is displayed here for additional **COMM** radios.

TUNE 3/4 (Page 3 of 4) NAV

Pressing the **TUNE** Key again will display this page and the following information may be observed.

NAV 1 or **NAV 2:**

The station identifier to which the respective **NAV** receiver is tuned. **(KEY)** will be displayed when the frequency or identifier of the station has been entered using the CDU keyboard.

FREQ:

The frequency currently tuned and displayed on the respective control head. **(MAN)** in this field indicates the frequency was manually entered via the control head. The field may also show **(KEY)** if the ident is unknown and the frequency was tuned via the CDU keyboard. **(KEY)** will appear in the **NAV 1** or **NAV 2** field if the **IDENT** is known. No annunciation in this field indicates the VPU is automatically tuning the NAV radio. (Figure 2-67)

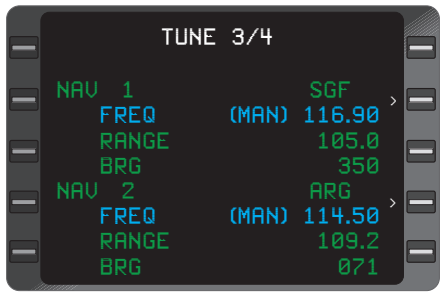


Figure 2-67

RANGE:

The range in nautical miles and tenths from aircraft present position to the DME. (Figure 2-67) The station identifier can also appear in the field between the range and range value field if the control head is placed in the DME HOLD mode. **NO ID** is displayed in this field if the identifier of the held station is unknown.

BRG:

The bearing in whole degrees from aircraft present position to the VOR. (Figure 2-67)

When the dedicated DM441B or the dedicated DME42 is configured, the **TUNE 3/4** page is different (Figure 2-67a). The Bearing information is suppressed and DME is annunciated instead of NAV.

When the non-dedicated DM441B is configured, the **TUNE 3/4** page is different (Figure 2-67b). The Bearing information is suppressed and the radios cannot be manually tuned.

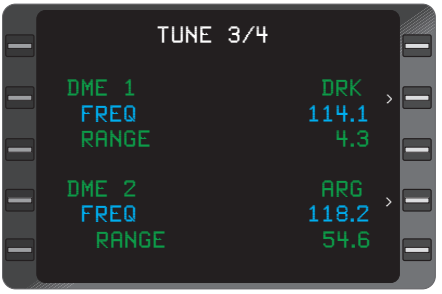


Figure 2-67a

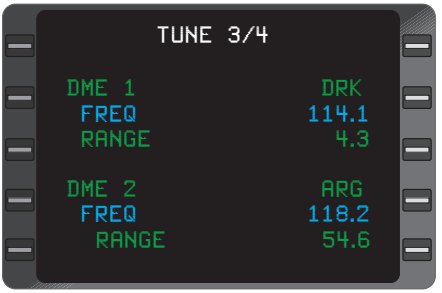


Figure 2-67b

TUNE 4/4 (Page 4 of 4) XPDR/ADF

Pressing the **TUNE** Key again will display this page and the following information may be observed.

XPDR:

*NOTE: If the transponder reply code appears briefly after tuning but turns to dashes, the system interface does not provide a return frequency input. **(MAN)** indicates the entry was made through the control head. (Figure 2-68)*

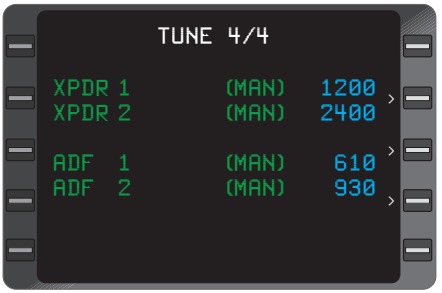


Figure 2-68

ADF:

*NOTE: If the frequency that the **ADF** is tuned to appears briefly but turns to dashes because the system interface does not provide a return frequency input. It may also be annunciated with (**MAN**). (Figure 2-68)*

*NOTE: If either the **XPDR** or **ADF** frequencies are tuned via the CDU keyboard the **(MAN)** field will be blank.*

HOLDING PATTERN SECTION (HOLD KEY)

HOLDING PATTERN PAGE

This page is accessed by depressing the **HOLD** Key when the cursor is positioned over a Waypoint Identifier.

HOLDING PATTERN 1/1 (Page 1 of 1)

AT:

The Holding Fix and country name or airport ident. (Figure 2-69)

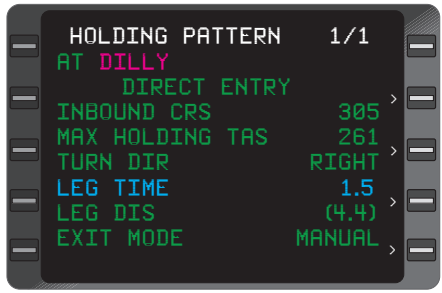


Figure 2-69

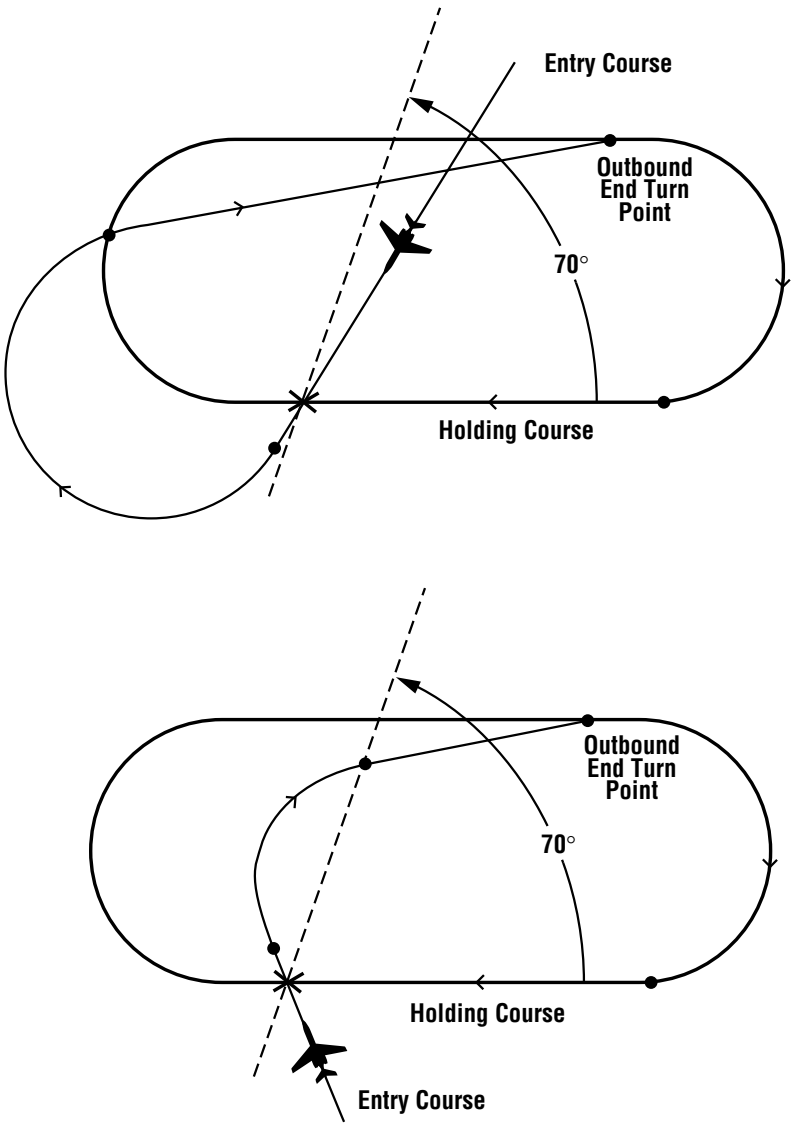
• HOLDING PATTERN ENTRY AND STATUS MESSAGE:

If the entry course to the holding fix can be determined, the entry procedure will be annunciated after all the holding pattern parameters are entered.

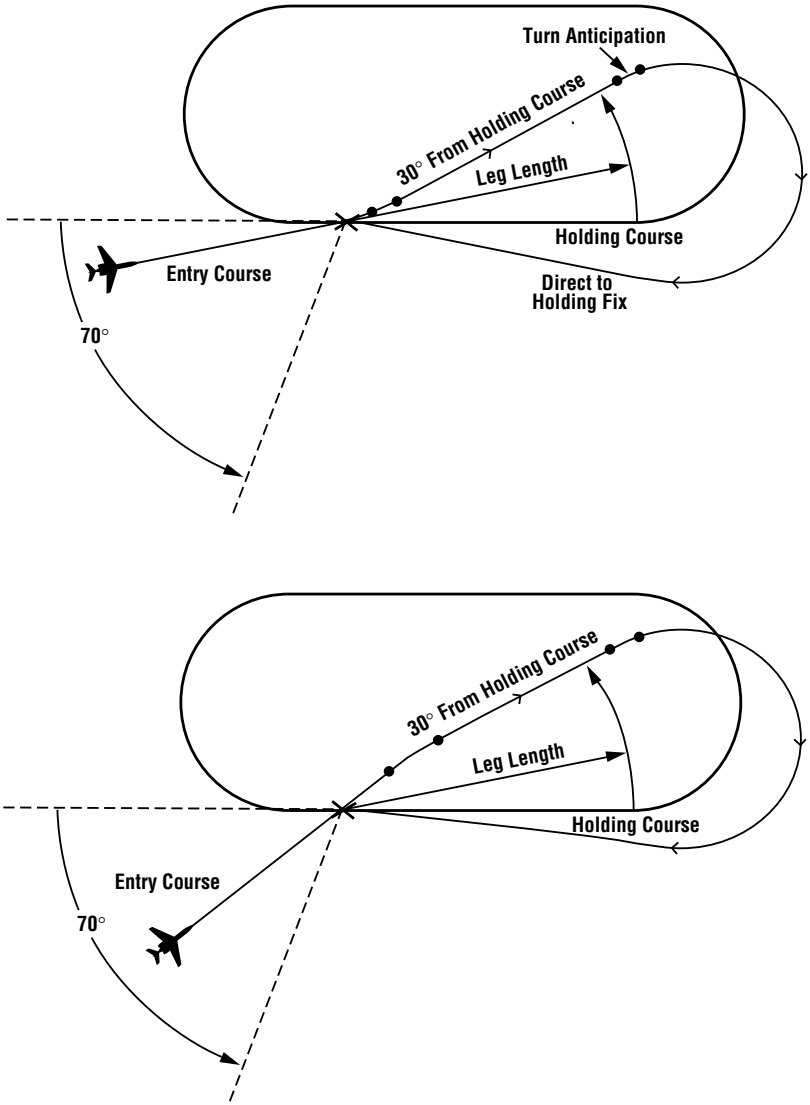
• DIRECT ENTRY: indicates the system will use a direct entry to the holding pattern. See Figure 2-70 for Direct Entry pattern.

• TEARDROP ENTRY: indicates the system will use a teardrop entry to the holding pattern. See Figure 2-71 for Teardrop Entry pattern.

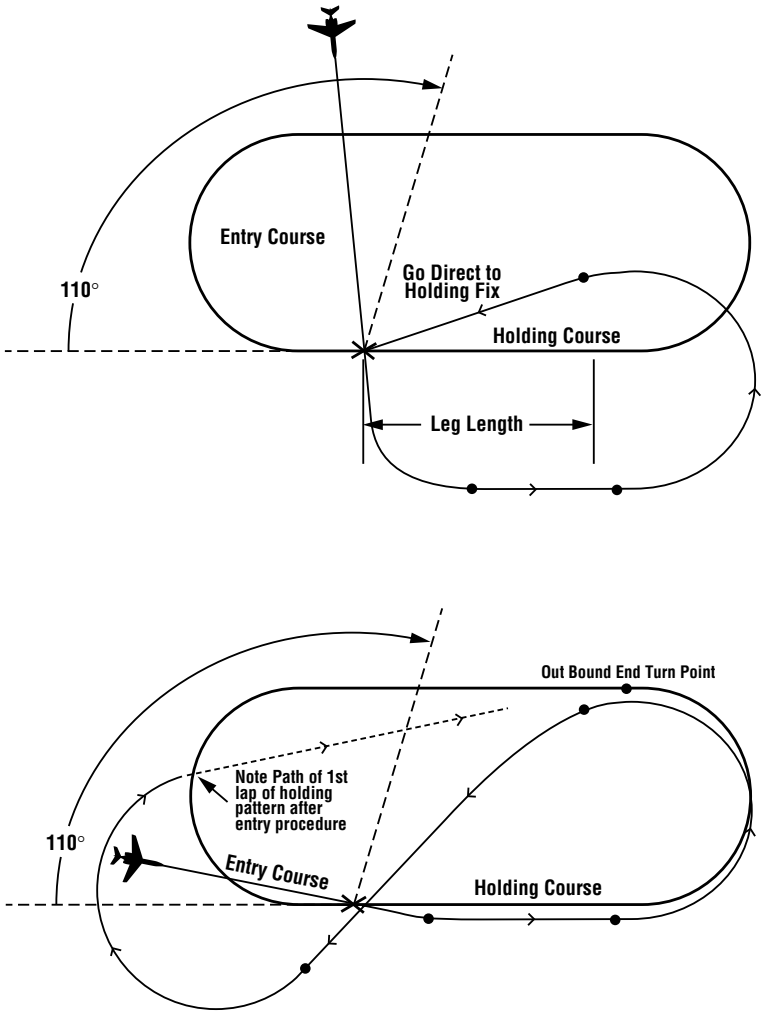
• PARALLEL ENTRY: indicates the system will use a parallel entry to the holding pattern. See Figure 2-72 for Parallel Entry pattern.



Direct Entry Pattern
Figure 2-70



Teardrop Entry Pattern
Figure 2-71



Parallel Entry Pattern
Figure 2-72

• **HOLDING:** indicates the system has entered the Holding Pattern. (Figure 2-73)

• **EXIT HOLD:** indicates the system will exit the holding pattern the next time over the holding fix.

INBOUND CRS (course):

The inbound holding course in whole degrees. This field can be True or Magnetic according to the display mode selected by the TRUE/MAG switch input. A **T** appears if in the True mode (Figure 2-73). The **T** field will be blank if the system is Magnetic mode.

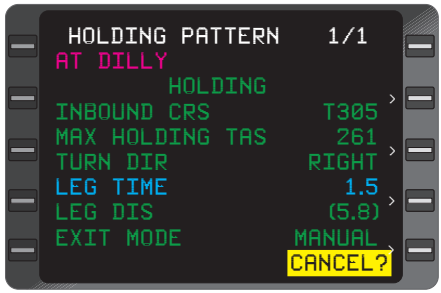


Figure 2-73

MAX HOLDING TAS:

This field is computed based on configuration module max holding indicated airspeed and worst case winds. It represents the maximum true airspeed in the holding pattern that will assure that the aircraft remains in protected airspace. (Figure 2-73)

TURN DIR (direction):

RIGHT indicates the standard default holding pattern turn direction. The non-standard **LEFT** turn can be accessed using the **BACK** Key when the cursor is over this field. (Figure 2-73)

LEG TIME:

Holding Pattern inbound leg time in minutes and tenths (1.0 to 9.9). (Figure 2-73)

*NOTE: The **LEG TIME** may be in parentheses indicating that the time has been calculated using **LEG DIS.***

LEG DIST (distance):

Holding Pattern inbound leg distance in nautical miles (1.0 nm to 50.0 nm). (Figure 2-73)

*NOTE: The **LEG DIS** may be in parentheses indicating that the distance has been calculated using **LEG TIME.***

EXIT MODE:

The **MANUAL** default indicates the system will stay in the holding pattern indefinitely. Using the **BACK** Key with the cursor over this field **AUTO** can be selected if the **ENT** key is pressed. The system will then execute a holding pattern entry and exit the next time crossing the fix waypoint. (Figure 2-73)

*NOTE: If a holding pattern is selected an **HP** is annunciated next to the waypoint on Flight Plan, Navigation and Direct To Pages.*

OK? ENT:

Depressing **ENT** Key when this prompt appears at the bottom of the Holding Pattern Page programs a Holding Pattern for a particular waypoint.

NOTE: The cursor will not appear in this field.

CANCEL:

Used to cancel a holding pattern. (Figure 2-73)

POSITION FIX PAGE

This page is accessed by depressing the **HOLD** Key anytime the cursor is not displayed over a waypoint.

POS:

The composite (system) position coordinates at the moment the **HOLD** Key was depressed in degrees, minutes, and hundredths of minutes. (Figure 2-74)

IDENT:

The alphanumeric designator of the reference waypoint used to check or update position. (Figure 2-74)

FIX :

The actual coordinates of the reference point in degrees, minutes, and hundredths of minutes. (Figure 2-74)

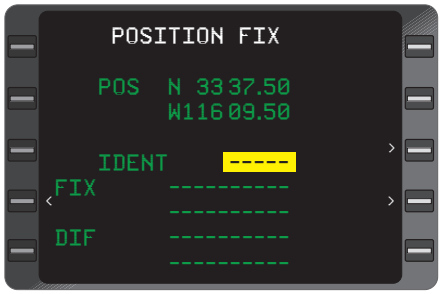


Figure 2-74

DIF:

The difference between the composite position and the **FIX** (or other sensor) position in degrees, minutes and hundredths of minutes. (Figure 2-74)

*NOTE: Position coordinates of individual sensors and the difference between those sensor positions and the composite (system) position may be displayed by moving the cursor over the **FIX** field and depressing the **BACK** Key. The composite position may be updated to the most accurate sensor by pressing the **BACK** Key until the desired sensor appears, then pressing the **ENT** Key twice.*

DIRECT TO SECTION (D→ KEY)

DIRECT TO PAGES

DIRECT 1/2 (Page 1 of 2)

This display is accessed through the D→ key and presents a listing of all Active Flight Plan waypoints on as many pages as is appropriate to display all of the waypoints. The cursor may be positioned over any desired identifier (ahead of or behind the aircraft) to proceed **DIRECT** (Figure 2-75). A new waypoint may be added to the flight plan to proceed direct.

TO:

When this page is accessed, the cursor is displayed over the current **TO** waypoint. (Figure 2-75)

The following may also be displayed with a waypoint: **HP** (Holding Pattern), **PT** (Procedure Turn), **MAP** (Missed Approach Point), **FAF** (Final Approach Fix), and **IAF** (Initial Approach Fix).

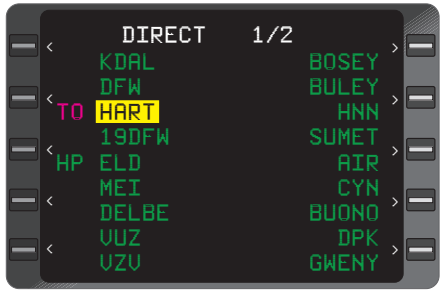


Figure 2-75

DIR CLOSEST ARP 2/2 (Page 2 of 2)

DIRECT TO CLOSEST AIRPORT: The Closest Airport page is the last page in the **DIRECT TO** section. Up to nine airports are displayed, in order of their proximity to the aircraft, with the closest airport listed first. (Figure 2-76)

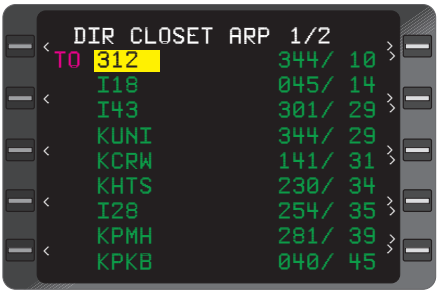


Figure 2-76

NOTE: Airports listed from the database on this page have runways 3000 ft long or greater and are hard surfaced.

WAYPOINT SECTION

WAYPOINT PAGES

Waypoints fall into four categories:

- Database generated
- Pilot entered (personalized/ offset)
- Special
- Obsolete

Waypoint Pages can be accessed from any **FLIGHT PLAN, NAV, D→, HOLD, INITIALIZATION, HEADING,** or **TRIP PLAN/FUEL PLAN** Pages.

DATABASE WPT 1/1 (Page 1 of 1) Database Generated Waypoints

This page is accessed by typing in a waypoint identifier or by placing the cursor over a waypoint identifier and pressing ENT.

Database Generated Waypoints are automatically updated when accessed and cannot be modified by the operator. The four basic types of waypoints residing in the data base are navaids, airports, intersections and special waypoints.

VHF Navaids

WAYPOINT:

Alphanumeric designator for the Navaid. (Figure 2-77)

NOTE: If the waypoint has a duplicate identifier in the database, for another location, the closest waypoint to the aircraft position will be shown and the country code will be displayed beneath the waypoint identifier. (Figure 2-78)

Press the **NXT** Key to sequence to the next waypoint page with a different country code. The **PRV** Key can be used to sequence backward through the waypoint pages. Additional country codes and corresponding **POS** coordinates will be sequentially displayed.

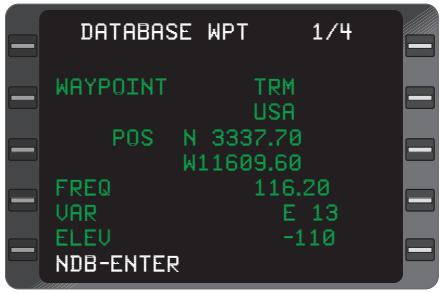


Figure 2-77

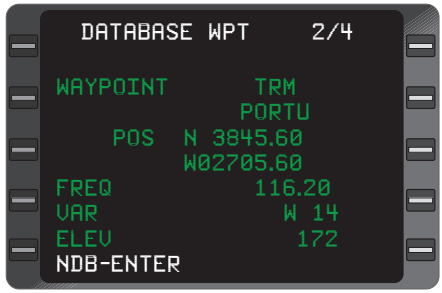


Figure 2-78

POS:

The coordinates of the waypoint as stored in the database memory. (Figure 2-77)

FREQ:

The VHF frequency for the station. (Figure 2-77)

VAR:

The magnetic variation of the station. (Figure 2-77)

ELEV:

The elevation in feet of the station (DME equipped VHF Navaids only). A (-) indicates elevation is below sea level. (Figure 2-77)

NDB -ENT:

The procedure for accepting the waypoint from the Navigation Data Base is to depress the **ENT** Key. (Figure 2-78)

Non-Directional Beacons (NDBs)

NDBs stored in the internal database are listed in Jeppesen publications with a 2 or 3 letter identifier. To distinguish these NDBs from VHF NAVAIDS, you must add an "NB" suffix to the database identifier. Example: To access the Prince Rupert (PR) NDB, you must enter PRNB. (Figure 2-79)

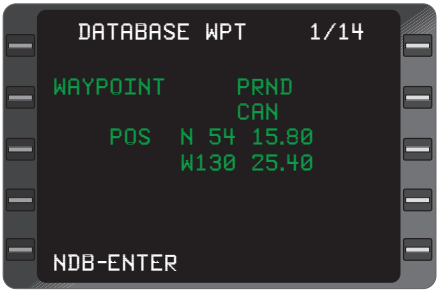


Figure 2-79

Airports

International Civil Aviation Organization (ICAO) identifiers are used to access data in the database.

ICAO identifiers differ in some cases from those familiar to many pilots.

The following are guidelines to access information from the database:

Except for a few hundred 3 or 4 letter/number airport identifiers in Alaska, Canada and the Continental USA, all airport identifiers stored in the database have 4 letters.

In most cases, these identifiers begin with a letter that corresponds to the geographic area in which the airport is located. The ICAO code letter prefix for Continental USA airports is **"K"**. Hawaii and Alaska identifiers begin with **"P"**.

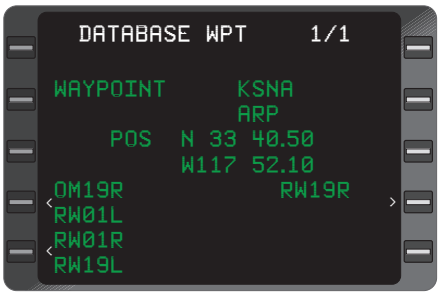


Figure 2-80

To access a 4 character identifier, use the IDENTIFIER found in the Jeppesen charts. For example, enter **KSNA** for Santa Ana. (Figure 2-80)

• If the airport shows a 3 letter IDENTIFIER, add the correct ICAO prefix letter. Example: **NEW** (New Orleans Lake Front) add a **"K"** prefix and enter **KNEW** (Figure 2-81).

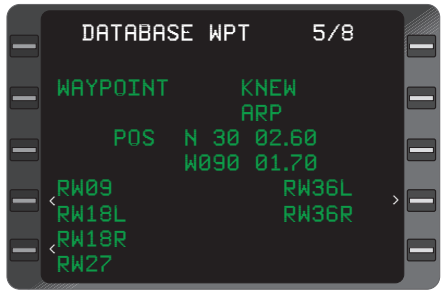


Figure 2-81

• If the airport shows a 3 character (letters and numbers) IDENTIFIER, enter the identifier as printed. Example: 31J (Lake City, Florida) enter 31J. (Figure 2-82)

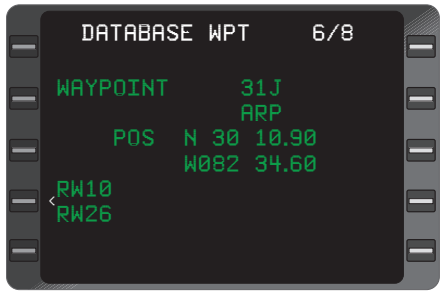


Figure 2-82

Airport Reference Points, Outer Markers, Runway Thresholds

Airport Reference Point **(ARP)** coordinates are always displayed in response to the airport identifier.

Outer markers and runway thresholds for which data is stored in the database are also displayed on the airport waypoint page (also known as airport continuation records page) and can be accessed by pressing the **PRV** or **NXT** Key or Line Select Keys. (Figure 2-83)

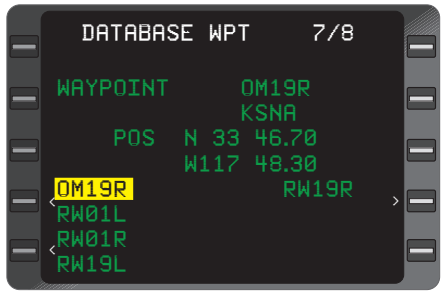


Figure 2-83

The selected outer marker or runway threshold will then be displayed in place of the airport identifier in the waypoint field. The airport identifier Shifts to and replaces the **ARP** field below. (Figure 2-83)

Intersections/Enroute Waypoints

Most intersection waypoint identifiers consist of 5 letters. However, 3, 4, and 5 letter and number combinations exist. To access these waypoints, simply enter the identifier from the Jeppesen chart. Example: **WHALE** intersection. (Figure 2-84)

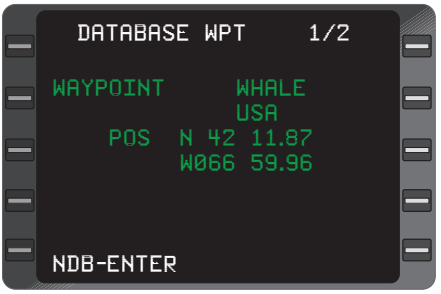


Figure 2-84

SPECIAL DATABASE WAYPOINTS

PILOT ENTERED WPT (Personalized) Waypoint

The operator is responsible for generating the waypoint data and maintaining its accuracy.

WAYPOINT:

The alphanumeric designator selected by the pilot. Identifiers can consist of up to six characters, and can be composed of any of the characters on the keyboard. (Figure 2-85) However, the asterisk (*) and pound sign (#) have special functions.

POS:

Blank fields for entering the latitude and longitude of the waypoint. When initially accessed (waypoint not yet in memory) the coordinate fields are both dashed and covered by a double cursor. (Figure 2-85)

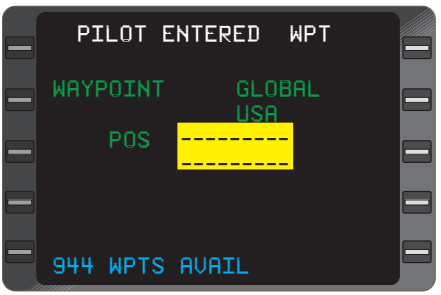


Figure 2-85

WPTS AVAILABLE:

The number of waypoints available in memory after this waypoint is defined. Maximum waypoint storage in non-volatile memory is 999. (Figure 2-85)

WAYPOINT:

(Figure 2-86). Same as previous.

POS:

If the waypoint has been previously defined, the coordinates of the waypoint will be displayed as stored in memory. These coordinates may be changed at any time. (Figure 2-86)

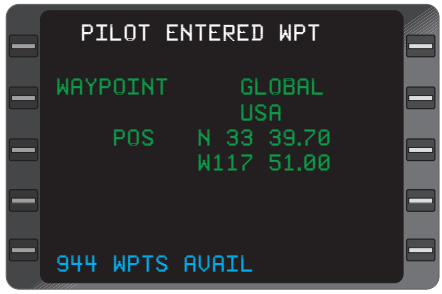


Figure 2-86

OK? ENT:

The procedure for accepting the waypoint if the coordinates are correct is to depress the **ENT** Key. (Figure 2-86)

OFFSET WAYPOINT

An offset waypoint is a set of coordinates determined by a selected radial and distance from a previously defined or database (parent) waypoint. An ***** following the parent waypoint denotes an offset waypoint. (Figure 2-87)

More than one offset waypoint is allowed from one parent, using [*], [*1], [*A1], etc. as identifying notation.



Figure 2-87

NOTE: The offset waypoint uses station declination, if available, or it uses the calculated magnetic variation of the parent waypoint. All waypoints defined by a VHF Navaid in the National/International Airspace System are based on the VHF Navaid station declination. Since the magnetic variation and station declination may not be the same at a given Navaid, the FMS calculated position and the defined position may differ.

WAYPOINT:

The parent waypoint identifier followed by an ***.** When an offset waypoint identifier is entered and the waypoint has not been previously defined, the **RAD, DIS,** and **POS** fields are all dashed.

When the waypoint has been previously defined the coordinates will be displayed and the radial and distance values will be computed based on the location of the parent waypoint. (Figure 2-87)

If the parent waypoint is a waypoint from an airport continuation record (runway or outer marker associated with a specific airport), the airport identifier will be displayed immediately below the offset waypoint identifier.

If a parent waypoint has a duplicate identifier in the database, the country code will be displayed immediately below the offset waypoint identifier. (Figure 2-87)

RAD:

The radial from the parent waypoint in degrees and tenths of degrees, along which the offset is established. This entry will be annunciated with a **T** if a true heading input is received or if the parent waypoint is north of N 70° or south of S 60° latitude. (Figure 2-87)

*NOTE: The radial can be entered in whole numbers without a trailing 0. i.e. enter 070 or 70 and 070.0 will be displayed. To enter a tenth of a radial all 4 digits must be entered. i.e. 0701 will be displayed as 070.1. The **DIS** entry requires a trailing 0 be entered for any **DIS** value greater than .9. i.e. enter 100 to display 10.0.*

DIS:

The distance from the parent waypoint to the offset waypoint (1999.9 maximum enterable). (Figure 2-87)

POS:

The computed offset waypoint coordinates based on the pilot entered radial and distance from the parent waypoint. (Figure 2-87)

OK? ENT:

The procedure for accepting the waypoint if the coordinates are correct is to depress the **ENT** Key. (Figure 2-87)

SPECIAL WAYPOINTS

#0,#1 and **#OFF** are special waypoints defined automatically by the system based on the airplane position.

#0 After pressing the **D→** key and **ENT** key the position after the turn where the airplane intercepts the course to the direct to waypoint. The **#0** waypoint is defined as the point from which a DIRECT TO waypoint leg has begun. Should the DIRECT TO procedure require a turn,

#0 will be defined as the point at which the aircraft completes the turn and intercepts the direct course to the fix. **#0** will momentarily be displayed on an EFIS map. **#0** can only be defined by the system.

#1 The position at the point where the **POSITION FIX** Page was last accessed via the **HOLD** Key. #1 can only be defined by the system.

Power Off Waypoint

The Power Off Waypoint is a set of coordinates retrieved as the last known position when power is lost enroute. This page should be accessed by inserting **#OFF** in the **IDENT** field on the **POSITION FIX** Page after power has been restored and Initialization Enroute has been performed.

WAYPOINT #OFF:

The Power Off Waypoint designator. (Figure 2-88)

POS:

The last present position coordinates at loss of power. Coordinates are stored in non-volatile memory. (Figure 2-88)

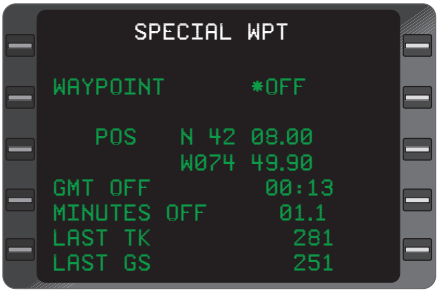


Figure 2-88

GMT OFF:

The actual time (Greenwich Mean Time) of power loss. (Figure 2-88)

MINUTES OFF:

The total time elapsed during power off. (Figure 2-88)

LAST TK:

Aircraft track at time of power off. (Figure 2-88)

LAST GS:

Last groundspeed in knots at time of power off. (Figure 2-88)

OCEANIC REPORTING WAYPOINTS

These waypoints are in the database and are used for oceanic position reporting. These waypoints can be added to the FPL by typing special numbers. See Section 3, ADDING A WAYPOINT.

OBSOLETE WAYPOINT

Obsolete Waypoints are typically created when a multiply defined database waypoint used on a stored flight plan is no longer found in the database. This may happen when a new data-base is loaded. An obsolete waypoint can be accessed only by verifying it as an existing waypoint on a flight plan. It will be lost once it is erased from a stored flight plan.

MESSAGES (MSG KEY)

System and Sensor messages are displayed on separate pages in the Message Section. They are accessed by depressing the **MSG** Key. The Message Section will consist of as many pages as are required to display current messages. The **MSG** Key is used to sequence through the System and Sensor Message Pages and to return to the page that was displayed before accessing the Message Section.

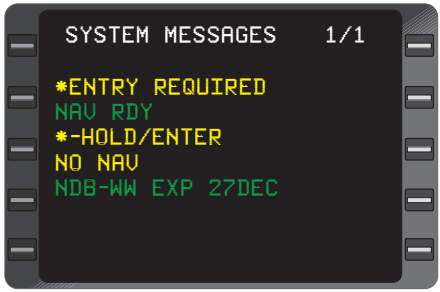


Figure 2-89

NXT, BACK, and **PRV** keys can be used to page forward and backward through the message pages.

System Messages describe the system's operation with all related aircraft systems (Figure 2-89). Sensor Messages describe the operational status of each navigation sensor (Figure 2-90).

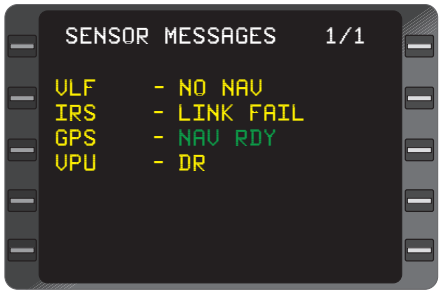


Figure 2-90

In most instances when new messages are added, the Message light will flash and a flashing yellow asterisk will appear adjacent to the new message.

SYSTEM MESSAGES

ACTION REQUIRED:

The following are the action required messages that may appear on the **SYSTEM MESSAGES** Page. All will cause the message annunciator to flash.

System Message	Explanation
ENTRY REQUIRED	Information required on the Initialization Page must be verified/entered. (Date, GMT and Position).
HOLD/ENT	Manual procedure for putting the VPU (non-IRS equipped) into the Primary Navigation Mode when groundspeed is less than 50 knots.
MAN HDG REQD	There is no heading input to the system and an H-field antenna is installed with the RPU. A manual heading entry must be made on NAV Page 3.
MAN TAS REQD	There is no TAS input to the system and the RPU is using fewer than three Comm stations for navigation. A manual TAS entry must be made on NAV Page 3.
VERIFY POSITION	Aircraft composite (blended) position is in question and must be manually verified.
VAR WARNING	Magnetic variation cannot be automatically computed, and **MAN VAR REQD.** A manual variation entry must be made on NAV Page 3 (i. e. aircraft position is north of 70° N latitude or south of 60° S latitude).

ADVISORY:

The following are the advisory messages that may appear on the **SYSTEM MESSAGES** Page. All will cause the message annunciator to flash unless otherwise noted with an asterisk *.

System Message	Explanation
ALTITUDE FAIL	The altitude input to the system has failed.
***APRCH ARMED ENTER TO CANCEL?**	Approach is ready to be executed. Pressing **ENT** will cancel the sequence. Displayed within 30NM radius of the airport. CDI sensitivity changes to 1NM full scale deflection. VNAV Deviation changes to 500 ft. full scale deflection. The message annunciator will not illuminate.
***APRCH NEXT ENTER TO CANCEL?**	Aircraft is within 3NM of the FAF. CDI sensitivity changes from 1NM to .3NM full scale deflection. The message annunciator will not illuminate.
***APRCH ACTIVE ENTER TO CANCEL?**	Approach sequence is being executed. Pressing **ENT** will cancel the approach. The message annunciator will not illuminate.
APRCH CANCELED	System is in an Approach Mode and the approach is changed or deleted from the Active Flight Plan.
APRCH WARN	The aircraft is within 2 NM from the FAF and GPS is in Dead Reckoning (DR) or there is no RAIM available. HSI is flagged.
CNFG DATA LOST	CDU non-volatile memory has lost its configuration information and the configuration module has failed.
CNFG MODULE FAIL	Configuration module has failed. CDU non-volatile memory configuration information will be used.
COMPASS FAIL	The aircraft's compass heading input to the system is invalid.
DATA BASE INVALID UPDATE ABORTED	The data base is invalid because the last attempt to update the data base was aborted.

ADVISORY: (continued)

System Message	Explanation
DR HDG/TAS **DR TK/TAS** **DR TK/GS** **DR HDG/GS**	The system is in the Dead Reckoning (DR) Mode and is using one of these four combinations of inputs to compute position.
EXT WPT REJECT	CDU has rejected an external waypoint input from a radar or EFIS. (Maximum 99 external waypoints received or 999 waypoints stored).
HIGH HOLDING SPD	During Holding or when system is about to enter a Holding pattern, TAS is high enough to cause the aircraft to stray outside the boundaries of protected airspace.
IRS ONLY>30 MIN	System has been operating enroute in IRS Only Mode for more than 30 minutes. The message annunciator will not illuminate if the aircraft is Weight On Gear.
IRS ONLY>10 MIN	System has been operating in the terminal area in IRS Only Mode for more than 10 minutes. The message annunciator will not illuminate if the aircraft is Weight On Gear.
MEM FAIL	Non-volatile memory has failed at least partially.
***NAV RDY**	The system is ready to be placed in the Primary Navigation Mode. Message annunciator will not illuminate. This message is displayed only when GPS is unavailable and another senbeor is being used.
NDB FAIL	Database has failed.
NDB OUTDATED	Expiration date of the database has been reached. Database should be updated.
NDB-WW EXP 27OCT	Worldwide (WW) or North American/ European (NA) database and expiration date.
NO AUTO LEG CHG	An automatic leg change will not occur upon reaching the TO waypoint. Message annunciator will not illuminate most of the time.

ADVISORY: (continued)

System Message	Explanation
NO NAV	The system is not navigating. Message annunciator will not illuminate.
POS WARN>1.7 NM	Based on the signal strength or geometry, the VPU sensor quality may be such that the composite position may have more than 1.7 nm error and may not be suitable for navigation in the terminal areas.
POS WARN>2.8 NM	Based on the signal strength or geometry, the VPU or VLF sensor quality may be such that the composite position may have more than 2.8 nm error and may not be suitable for enroute navigation on J/V routes.
POS WARN>3.8 NM	Based on the signal strength or geometry, the VPU or VLF sensor quality may be such that the composite position may have more than 3.8 nm error and may not be suitable for enroute navigation on J/V or Random routes.
POWER OFF POS	The system has lost power in flight for more than 7 seconds and the **#OFF** waypoint is available. Reviewing the **#OFF** waypoint page removes this message.
SENSOR MISCOMPARE	The difference between the CDU composite (blended) position and a sensor position exceeds a predetermined amount.
***STRG INVALID**	The system has stopped computing a roll command steering output due to invalid heading, auto-TAS, navigation leg, groundspeed or crosstrack distance. Message annunciator will not illuminate.
TAS FAIL	The True Airspeed input to the system from the Air Data Computer is invalid.
USING MAN HDG	An H-field antenna is installed with the RPU and a manual heading input is being used.

ADVISORY: (continued)

***WPT ALERT**	The aircraft is within 30 seconds ETE of the next leg lateral change. Message annunciator will not illuminate.
WPT MEM FULL	All 999 waypoint locations have been used in flight plans or as FROM or TO waypoints.
VNAV WPT ALERT	Aircraft is within 1 minute ETE of **#TOD** or path intercept point. Message annunciator will not illuminate. However the discrete WPT annunciator will flash for 10 seconds then go steady
VSPD FAIL	The system vertical speed input has failed.

SENSOR MESSAGES

The following are sensor messages that may appear on the **SENSOR MESSAGES** Page. All messages will cause the **MSG** annunciator to flash unless other wise noted with an asterisk*.

Sensor Message	Explanation
ACCURACY WARN	The integrity monitoring system that monitors the satellite constellation (RAIM) has detected a GPS horizontal position error that is outside the alarm threshold for the phase of flight in progress. (.3NM Approach; 1NM Terminal; 2NM Enroute)
ALIGN	The IRS is in the alignment mode and is not yet **NAV RDY**.
ATTITUDE	The IRS is in the Attitude mode.
BATTERY WARN	The sensor is operating on its own internal battery.
CHECK QUAL	The VPU quality factor has exceeded the pilot entered advisory quality factor.
***DESELECTED**	The sensor has been manually deselected and will no longer contribute to the computation of composite (blended) position. Message annunciator will not illuminate.

SENSOR MESSAGES: (continued)

Sensor Message	Explanation
DR	Either the VLF (RPU), GPS or VPU sensor is in the Dead Reckoning (DR) mode of navigation. The message annunciator will not illuminate for VPU.
ENTR SET HDG	The IRS is in the attitude mode and a heading value must be entered.
LINK FAIL	Data exchange between the sensor and CDU has failed.
***NAV RDY**	The sensor is capable of navigation, but has not been placed in the navigation mode. Message annunciator will not illuminate. Only displayed when GPS sensor is not available.
***NO NAV**	The sensor has not navigated since system power up. Message annunciator will not illuminate.
NO RAIM	RAIM is not available at this time.
NO RAIM @ DEST	RAIM is available at the present time, but will not be available at the destination arrival time.
NO SYNC	Omega synchronization has not been completed.
RCVR FAIL	At least one Communication or Omega receiver has failed.
STD FAIL	The rubidium frequency standard in the RPU has failed.

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SECTION 3

SYSTEM OPERATION

PRE-DEPARTURE

POWER ON/OFF AND PARALLAX ADJUSTMENT

1. **ON** Key - DEPRESS (momentarily). The **SELF TEST** Page (Figure 3-1) will be displayed for approximately 30 seconds. During the time the **SELF TEST** message is displayed, the system is performing internal self tests. If the system was turned OFF last by the removal of aircraft power, the system will turn ON automatically when aircraft power is applied.



Figure 3-1

2. **BRT** Key - Adjust as required. The display will initially come on at 75% of full bright. DEPRESS and hold the **BRT** Key to dim the display. Release the **BRT** Key. DEPRESS and hold again to brighten the display. To attain 100% brightness depress and hold **BRT** Key again until the display no longer gets brighter.

*NOTE: The display may be changed instantaneously to 75% of full bright from any brightness level by momentarily depressing the **ON** Key.*

3. Parallax Adjustment - If the Line Select Keys do not align with the line select prompts on the screen, DEPRESS the **BRT** Key (If the screen begins to dim, release the **BRT** Key then depress again and hold while momentarily pressing the ⊣⊢ Key, then the **P** Key. Using the **U** (Up) or **D** (Down) Key, adjust the display to the desired alignment. DEPRESS any key when alignment is complete.

4. To turn the system off, depress the **ON** Key and hold for three seconds.

INITIALIZATION PAGE

It is important that the initialization position and the first waypoint of the Active Flight Plan are the same so that the TO/FROM Leg Distance displays the correct information. The DIRECT TO function to the first waypoint on the flight plan may also be used to insure distance accuracy.

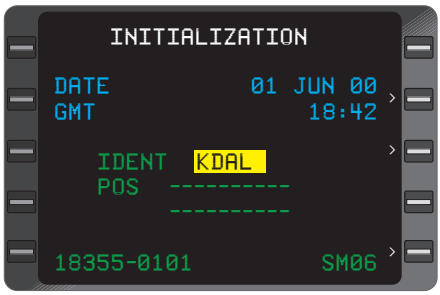


Figure 3-2

The Initialization Page gives the pilot access to the required initialization data (Date, GMT and Position). Following confirmation or entry of this data, the page disappears and cannot be retrieved unless the system power is removed and then restored. GMT and Date are available for display in the **PLAN** section and Position is available in the **NAV** section.

DATE and GMT

The **DATE** and **GMT** are continuously updated while the system is off. If non volatile memory is erased the date and time field will be dashes. When the system is turned on, the **DATE** and **GMT** will appear on the Initialization Page. If the **DATE** is incorrect, move the cursor to the **DATE** field to update manually.

1. **DATE** - INSERT, if required (day/month/year - digits only). For example: March 1, 1995 would be entered as 01 03 95. Enter a leading 0 for months with a numerical value of less than 10.
2. **ENT** Key - DEPRESS to verify display.
3. **GMT** - INSERT, if required (hours and minutes). If the GMT is incorrect, update manually.
4. **ENT** Key - DEPRESS to verify display.
5. **MSG** Key - DEPRESS to verify Database Expiration Date and review other System Messages. Continue depressing **MSG** Key to review **SENSOR MESSAGES** and to return to **INITIALIZATION** Page.

INITIALIZATION POSITION

The Initialization Position for non-IRS equipped systems should be the departure runway threshold. For IRS equipped systems, the ramp or alignment LAT/LONG position should be inserted as Initialization Position.

NOTE: Once the INITIALIZATION Page appears, and after a brief delay, the IDENT field normally prefills with the ICAO ident of the airport closest to the aircraft position at shut-down, provided the aircraft's real position and system position were the same at system shutdown.

The Departure Position may be entered using either:

Option 1: Using the IDENT field for non-IRS equipped systems

Option 2: Using the POS field

Option 1: Using the IDENT field for non-IRS equipped systems

(Entering Alpha and Numeric Identifiers on the Initialization Page)

1. Line Select Key - DEPRESS to position cursor over the IDENT field (if required).

 Enter letters of the departure airport's ICAO identifier. Enter letters and numbers of the departure airport if it is a non-ICAO identifier.

2. **ENT** Key - DEPRESS.

3. Airport Reference Point (ARP) coordinates will be displayed with continuation records listed below.

 To access the airport continuation records, position the cursor over a departure runway identifier. This will automatically result in the display

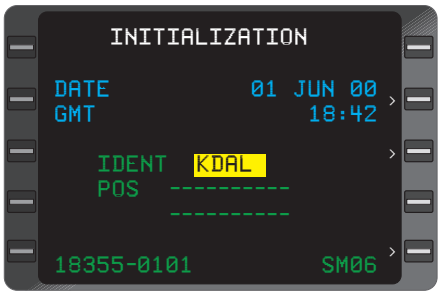


Figure 3-3

of the departure runway threshold in the waypoint field, the departure airport identifier will replace the **ARP** field, and **POS** coordinates will reflect selected runway threshold. (Figure 3-4)

4. **ENT** Key - DEPRESS.

5. **POS** Coordinates - VERIFY coordinates highlighted by the cursor on the Initialization Page. (Figure 3-5)

6. **ENT** Key - DEPRESS.

If AFIS is not installed, the display will automatically advance to the **FLIGHT PLAN LIST** Page. The cursor will be positioned over the first Flight Plan Number that originates with the same airport or runway identifier as entered on the **INITIALIZATION** Page (Figure 3-6). Stored Flight Plans are referenced according to Departure and Destination pairs and are automatically sequenced in alphabetical order on the **FLIGHT PLAN LIST** Page. The cursor may be placed over the desired **FPL** number. To review the **FPL** press **ENT.**

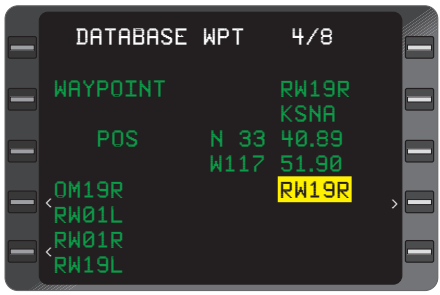


Figure 3-4

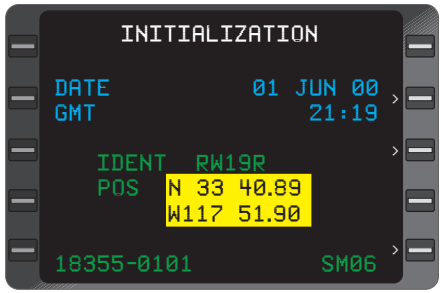


Figure 3-5



Figure 3-6

If AFIS/ACARS is installed, the display will advance to the **AFIS FPL** Page or the **ACARS Initialization** Page after the system is initialized.

Option 2: Using the POS field

For IRS equipped systems, the ramp or alignment LAT/LONG position should be inserted as the Initialization Position using **POS** Coordinates.

1. Line Select Key - DEPRESS (cursor over **POS** field).
2. **POS** Coordinates - VERIFY. Coordinates displayed are the computed position when the system was shutdown. If correct, these coordinates may be used as the Departure Position.

If Incorrect:

a. Latitude - INSERT **N** or **S** first, then 6 numbers (degrees, minutes, and hundredths).

b. **ENT** Key - DEPRESS. (See Note)

c. Longitude - INSERT **E** or **W** first, then 7 numbers (degrees, minutes, and hundredths).

*NOTE: If coordinate field flashes after entry, verify coordinates and depress **ENT** again. Coordinate field will flash if the entered value varies more than 10 arc minutes from the displayed value.*

*If only one coordinate is in error, it may be updated individually by depressing **N, S, E,** or **W** Key to access the desired field.*

3. **ENT** Key - DEPRESS.

If AFIS is not installed in the system, The **FLIGHT PLAN LIST** Page will now be displayed. A Flight Plan may be selected by bringing the cursor on to the **FLIGHT PLAN LIST** Page over the desired flight plan number and pressing **ENT**.

*NOTE: If necessary, use the **PRV** or **NXT** Key to cycle through all available **FLIGHT PLAN LIST** Pages.*

If the desired flight plan does not appear, a new flight plan may be created. (See Building Flight Plans)

If AFIS is installed in the system, the display will automatically advance to the AFIS Flight Plan Page. Here a flight plan may be selected from the disc that has been inserted in the AFIS DTU prior to turning on the system. (Refer to Section 7)

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BUILDING FLIGHT PLANS (FPL)

CREATING A FLIGHT PLAN

1. **FPL** Key - DEPRESS to display (Stored) **FLIGHT PLAN LIST** Page (if required).

2. Line Select Key - DEPRESS to position cursor on blank line and display the **NEXT FPL** number. (Figure 3-7)

 If several Flight Plans are displayed, position cursor anywhere on the page then depress the **BACK** Key to show **NEXT FPL** number available.



Figure 3-7

*NOTE: If all 56 Flight Plans are used, **NO FPL AVAIL** will appear in the field. Any of the stored flight plans may be erased to allow additional entries. The procedure is described under Modifying A Flight Plan.*



Figure 3-8

3. ***ENT** Key - DE-PRESS to display **FLIGHT PLAN** Page. (Figure 3-8) NOTE: The **XFILL** prompt will only be displayed if the airplane is configured for dual systems.*

4. Type the appropriate departure airport or waypoint identifier in the cursor field.

*NOTE: Identifier may contain from 1 to 6 characters in any combination of letters and numbers. If an entry error is made, press the **BACK** Key to erase a character, then enter the correction.*

5. **ENT** Key - DEPRESS.

6. Waypoint Coordinates and Data - VERIFY. If a specific runway is desired, depress the appropriate Line Select Key to place the cursor over the desired runway.

7. **ENT** Key - DEPRESS to add waypoint to the FPL.

8. Repeat Steps 4 through 7 for the remaining waypoints. The destination airport identifier should be the last waypoint on the flight plan.

NOTE: Waypoints are generally obtained from the Navigation Data Base (NDB). Pilot entered offsets and waypoints may also be entered. See CREATING/CHANGING PILOT ENTED WAYPOINTS for a more in depth discussion.

NOTE: SID's, STARS, Enroute Airways, and non-precision approach procedures may also be entered on either the stored or active flight plan. See SIDs, STARs, APPROACHES AND ENROUTE AIRWAYS for more details.

A maximum of 50 waypoint identifiers can be entered on Stored Flight Plans and 100 on the Active Flight Plan.

*Attempting to enter more than the maximum allowed will cause **FPL FULL** to be displayed with the identifier flashing in the cursor.*

*If adding a SID, STAR or Approach to A Flight Plan will exceed the Flight Plan capacity. A **NO ROOM ON FPL** message will appear on the procedure page being displayed.*

*Attempting to enter more than 999 pilot entered waypoints in memory causes **MEM FULL** to be displayed on the **FLIGHT PLAN** Page. The **MSG** light will flash and **WPT MEM FULL** will be displayed on **SYSTEM MESSAGES** Page.*

To Delete a Waypoint

9. Line Select Key - DEPRESS to position the cursor over the waypoint to be deleted.

10. **BACK** Key - DEPRESS. A **DELETE?** prompt will appear adjacent to the waypoint to be deleted.

11. **ENT** Key - DEPRESS. The waypoint will be deleted.

MODIFYING A FLIGHT PLAN

To Access The Desired Flight Plan:

This procedure may be used to modify the Active Flight Plan or any Stored Flight Plan. Access the Active Plan or Stored Flight Plan by depressing the **FPL** Key. Access a Stored Flight Plan from the

alphabetized **FLIGHT PLAN LIST** Page. Use the **PRV** or **NXT** Keys to cycle through the available pages.

NOTE: A change made to the Active Flight Plan does not affect the Stored Flight Plan. Any change made to a Stored Flight Plan remains in memory.

Deleting A Waypoint:

1. Line Select Key - DEPRESS to position the cursor over the waypoint identifier.
2. **BACK** Key - DEPRESS. **DELETE?** appears in the waypoint field to inform the pilot of the pending change. (Figure 3-9)
3. **ENT** Key - DEPRESS. The waypoint is deleted and the cursor is displayed over the next waypoint. (Figure 3-10)



Figure 3-9



Figure 3-10

NOTE: Deleting a waypoint from either a SID, STAR, or Approach Procedure will invalidate that procedure as indicated by the waypoints of the procedure no longer being indented.

To remove a waypoint from non-volatile memory it must be deleted from all Stored Flight Plans. This does not include database waypoints.

ADDING A WAYPOINT

A waypoint may be added anywhere in a Flight Plan sequence, except prior to the current **TO** waypoint if the **ACTIVE FPL** Page is displayed.

1. Line Select Key - DEPRESS to position the cursor over the waypoint identifier that will follow the new entry. (Figure 3-11)
2. Type Waypoint Identifier - INSERT. (Figure 3-12)
3. **ENT** Key - DEPRESS.
4. Waypoint Coordinates - VERIFY or INSERT.
5. **ENT** Key - DEPRESS. The new waypoint is added to the Flight Plan sequence and the cursor is over the waypoint following the new entry. (Figure 3-13)



Figure 3-11



Figure 3-12



Figure 3-13

NOTE: Adding a waypoint to a SID, STAR, or Approach Procedure will invalidate that procedure as indicated by the waypoints no longer being indented.

Adding Oceanic Waypoints

Oceanic waypoints are entered in the same manner as other waypoints with one exception. Instead of entering a waypoint identifier, a five-character coordinate identifier, such as 3050N, is entered. The following rules are to be applied:

1. Positions in the Northern Hemisphere use letters “N” and “E”. Positions in the Southern Hemisphere use the letters “S” and “W”. Both will use numerics for latitude and longitude values as follows:

 a. Latitude - Latitude will always precede longitude.

b. Longitude - Use only the last two digits of the first, three-digit longitude value.

c. Letter Placement - The letter designator will be the last character in the five-character string if the longitude is less than 100 degrees and will be the third character in the five-character string if the longitude is 100 degrees or greater.

d. The letter “N” is used for north latitude and west longitude. The letter “E” is used for north latitude and east longitude. The letter ”S” is used for south latitude and east longitude. The letter “W” is used for south latitude and west longitude.

2. Examples:

North latitude/**West** longitude	**North** latitude/**East** longitude
N50 00/W040 00 = 5040N	N50 00/E040 00 = 5040E
N07 00/W008 00 = 0708N	N07 00/E008 00 = 0708E
N75 00/W170 00 = 75N70	N75 00/E170 00 = 75E70
N07 00/W120 00 = 07N20	N07 00/E120 00 = 07E20
South latitude/**East** longitude	**South** latitude/**West** longitude
S50 00/E040 00 = 5040S	S50 00/W040 00 = 5040W
S07 00/E008 00 = 0708S	S07 00/W008 00 = 0708W
S75 00/E170 00 = 75S70	S75 00/W170 00 = 75W70
S07 00/E110 00 = 07S10	S07 00/W120 00 = 07W20

USING DUPLICATE WAYPOINT IDENTIFIERS

1. Duplicate Waypoint Identifiers: There are several waypoints around the world with same identifier. If the identifier selected has more than one waypoint associated with it, additional pages will be indicated on line 1. i.e.1/2, 1/4, etc. The waypoint nearest the aircraft position will be displayed first. (Figure 3-14)

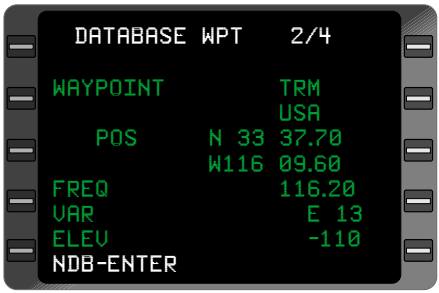


Figure 3-14

To select an alternate waypoint location:

2. **PRV** or **NXT** Key - DEPRESS until desired country name is displayed. (Figure 3-15)
3. **ENT** Key- DEPRESS to add the waypoint to the flight plan.

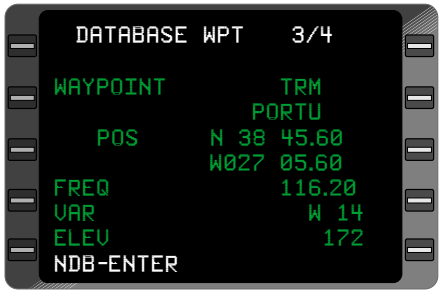


Figure 3-15

REVIEWING WAYPOINT DATA/COORDINATES (FLIGHT PLAN PAGES ONLY)

If the stored flight plan is currently displayed, proceed to Step 4.

To access the desired flight plan:

1. **FPL** Key - DEPRESS to locate the desired Flight Plan on the **FLIGHT PLAN LIST** Pages.
2. Line Select Key - DEPRESS to position the cursor over desired Flight Plan Number.
3. **ENT** Key - DEPRESS.
4. Line Select Key - DEPRESS to position cursor over identifier to be reviewed.
5. **ENT** Key - DEPRESS.
6. Waypoint Coordinates or data- VERIFY.
7. **ENT** Key - DEPRESS. The Flight Plan is displayed with the cursor over the next waypoint.
8. Repeat Steps 5 through 7 for remaining waypoints.

NOTE: This procedure may also be used for reviewing waypoint information on the Active Flight Plan Page.

ERASING A STORED FLIGHT PLAN

1. **FPL** Key - DEPRESS to display desired **FLIGHT PLAN LIST** Page.
2. Line Select Key- DE-PRESS to position the cursor over the number of the **FPL** to be erased.
3. **ENT** Key - DEPRESS.
4. Line Select Key - DEPRESS to position cursor over **ERASE?**
5. **ENT** Key - DEPRESS. All waypoints of the stored FPL will be erased.

*NOTE: If the Active Flight Plan is erased, all waypoints except the **FR** and **TO** are deleted. A fence (- - - - -) is displayed indicating no auto leg change beyond the **TO** waypoint.*

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FLIGHT PLAN (FPL) SELECTION

This procedure is used to transfer a stored FPL to active FPL status.

It is recommended that the initialization position and the first waypoint of the Active Flight Plan are the same so that the TO/FROM Leg Distance displays the correct information. The DIRECT TO function to the first waypoint on the flight plan may also be used to insure distance accuracy.

If a stored flight plan is currently displayed, proceed to Step 5.

1. **FPL** Key - DEPRESS (if required) until the desired **FLIGHT PLAN LIST** Page appears.

NOTE: If the desired Flight Plan is not listed refer to the procedure for Creating a Flight Plan. Page 3-7

2. Line Select Key - DEPRESS to position the cursor over the desired Flight Plan Number.

*NOTE: If desired Flight Plan number is known, position the cursor on the page, enter the number and depress **ENT** Key. The desired Flight Plan will be displayed.*

3. **ENT** Key - DEPRESS.

4. **FLIGHT PLAN** Page - VERIFY Flight Plan. Review routing by depressing **PRV** or **NXT** Key to page through multiple Flight Plan pages.

*NOTE: DEPRESS **FPL** or **NXT** Key to sequence to an alternate Flight Plan with the same departure destination pair and higher Flight Plan number.*

*DEPRESS **PRV** or **BACK** Key to sequence to a lower Flight Plan number with the same departure-destination pair.*

5. Line Select Key- DEPRESS to position cursor over **SELECT?** (Figure 3-16):

 a. to transfer the Stored Flight Plan to Active Flight Plan status continue with Step 6.

 b. to **INVERT** and transfer the Stored Flight Plan with waypoint sequence



Figure 3-16

reversed to Active Flight Plan status, press the **BACK** Key to display **INVERT?.** (Figure 3-17)

6. **ENT** Key - DEPRESS.

7. **ACTIVE FPL** - CONFIRM. Observe that the Stored Flight Plan transferred to the **ACTIVE FPL** Page as SELECTED or INVERTED. (Figure 3-18)



Figure 3-17



Figure 3-18

INITIAL LEG SELECTION

An initial From/To Leg or Direct To Leg must be established in order for the system to provide guidance along the Flight Plan. From the **ACTIVE FPL** Page , the following procedure is used.

1. **NAV** Key - DEPRESS.

2. **FR** Waypoint - VERIFY. The first waypoint on the Active Flight Plan will appear in the **FR** field. To change the **FR** waypoint, insert the desired identifier.

3. **ENT** Key - DEPRESS. The next waypoint in the Active Flight Plan sequence will appear in the **TO** field.

4. TO Waypoint - VERIFY. To change the **TO** waypoint, insert the desired identifier.

5. **ENT** Key - DEPRESS.

6. **DIS, DTK** - CHECK for reasonableness. (Figure 3-19)

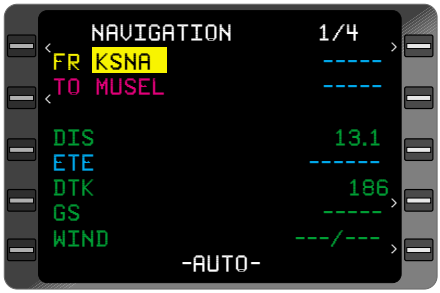


Figure 3-19

If this leg selection is part of an active flight plan involving Oceanic/Remote operation using GPS as the sole navigation source, an FDE prediction to determine sufficient GPS availability must be per-

formed prior to departure. Refer to the Special Procedures section for instructions on performing the FDE prediction procedure.

BEFORE TAXI (IRS EQUIPPED)

The Inertial Reference System (IRS) should be aligned and placed in the Navigation Mode using the IRS manufacturer's operating instructions.

1. **MSG** Key - DEPRESS for IRS Sensor Messages.

 SENSOR MESSAGES Page will show **IRS-ALIGN** during alignment sequence. When the IRS is in normal Navigation Mode no IRS messages will be displayed.

2. IRS Status - VERIFY NAV. Observe that no IRS messages appear on the **SENSOR MESSAGES** Page.

RUNWAY LINE-UP (IRS EQUIPPED)

Provided an accurate alignment position was entered and the IRS was placed in the Navigation Mode prior to taxi, no further action is required.

IRS, VLF (RPU), GPS AND/OR VPU EQUIPPED

On the ground the system will navigate deriving composite position and groundspeed from the GPS or IRS, provided the IRS was aligned and placed into the Navigation Mode prior to taxi. All other sensors (VLF and VPU) will enter the Primary Navigation Mode automatically at 50 kts (IRS) groundspeed or weight-off-wheels, provided they have sufficient stations to begin navigation. Momentarily depressing **HOLD** Key, then **ENT,** and **ENT** again will also put the sensors in the primary NAV mode if sufficient stations are available.

VLF (RPU) AND/OR VPU EQUIPPED ONLY

This procedure is used to manually place the system into the Primary Navigation Mode at the designated departure position i.e. the end of the departure runway. The VLF is a position keeping sensor that can navigate with as few as two suitable stations. The VPU is a position finding sensor that can navigate once airborne or within line of sight of suitable navaids.

1. **MSG** Key - DEPRESS.

2. **NAV RDY - HOLD/ENT** Message - VERIFY. This message indicates that the system is ready to enter the Primary Navigation Mode.

3. **MSG** Key - DEPRESS to verify status of all sensors. Observe **NAV RDY/NO NAV** messages for appropriate sensor and refer to the Flight Manual Supplement for limitations.

4. **HOLD** Key - DEPRESS to verify departure coordinates.

5. **ENT** Key - DEPRESS twice to enter Primary Navigation Mode.

*NOTE: If the **[HOLD/ENT/ENT]** procedure had not been initiated prior to takeoff, the system and the various sensors will enter the Primary Navigation Mode automatically at weight-off-wheels, or at a true airspeed of between 50 and 150knots, depending on configuration.*

SIDs, STARs, APPROACHES AND ENROUTE AIRWAYS

The GNS-XL SID (Standard Instrument Departure), STAR (Standard Terminal Arrival), Approach and Airway retrieval feature is designed to relieve flight crew workload. SIDs and STARs require such procedures as flying headings and altitudes, as well as intercepting VOR radials and DME arcs, etc. Approaches can be flown autopilot/fight director coupled until the Missed Approach Point. Missed Approach Procedures must then be flown manually. The GNS-XL is ONLY designed to provide meaningful input to the HSI when on a track between two waypoints or when Pseudo Vortac (selected course) procedures are used. **THE SYSTEM IS NOT DESIGNED TO FLY FULL SID, STAR OR MISSED APPROACH PROCEDURES.**

NOTE: The flight crew must review the published procedure and compare it to the procedure contained in the database. The published charts are the governing authority and the chart procedures must be followed. Any differences between the chart and the database must be resolved by the flight crew prior to commencing the procedure.

When flying those portions of a SID or STAR that are not tracks between fixes, the aircraft should be flown manually or in HEADING mode. In some cases, Pseudo Vortac procedures can be used to establish an intercept to a published track. When using the Pseudo Vortac mode, or upon intercepting a published track between two waypoints (fixes), the aircraft may be flown in reference to the cross track deviation provided by the GNS-XLS or by coupling the GNS-XLS roll command to the auto pilot.

The first leg of the SID that the FMS can fly is not the first leg of the procedure. To properly fly SIDs, the flight crew must manually fly the procedure to a point where the FMS can fly the procedure properly. The first leg of the SID that the FMS can fly is usually the first way-

point after the airport identifier or departure runway. After loading the SID on to the Active FPL, access NAV Pg 1. Enter the first waypoint after the runway or airport identifier in the FR field. Press ENTER. The TO field will display the next waypoint in sequence from the FPL. Press ENTER again to complete the initialization of the first leg of the flight plan. The flight crew must manually fly the airplane until reaching the first leg of the SID that can be flown by the FMS.

The following procedures contain leg types that the FMS cannot automatically fly, and require manual intervention by the pilot. The following operational procedures are recommended.

NOTE: Some SIDs and STARs require intercept procedures upon reaching a specified altitude. In these cases, execute the Pseudo Vortac, Direct To or Heading Intercept procedure upon reaching the specified altitude.

The CDU display, Figure 3-21, shows the waypoints that would be added to the flight plan through reference to the **ELMAA5** SID, **HQM** transition from **RW16L**.

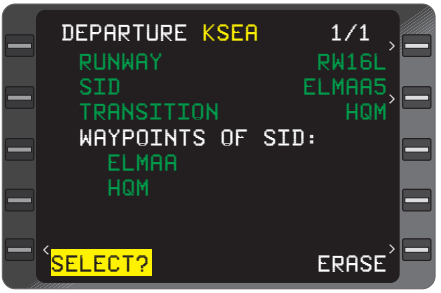


Figure 3-21

Heading to Intercept Procedures

The shaded area on the SID chart, Figure 3-20, is an example of the portion of the procedure that must be flown manually or in the F/D heading mode. No reference to the GNS-XL should be made at this time.

For procedures like the example in Figure 3-20, the following operational procedures are recommended.

1. Prior to departure, tune the Seattle VOR, select the VOR as the NAV source and set the HSI course pointer to 158°.

2. After departure, intercept the SEA 158° radial. After crossing the SEA 5 DME fix at or above 3000', turn right to 250°.

3. Select the FMS Heading and enter 250, then Intercept mode on the FMS. Select **ELMAA** as the TO waypoint and enter 227 in the **DTK** field and press **ENTER**.

4. Select the FMS as the NAV source.
5. The FMS will fly the remainder of the SID to **HQM**.

NOTE: This is known as the FMS HEADING/INTERCEPT procedure.

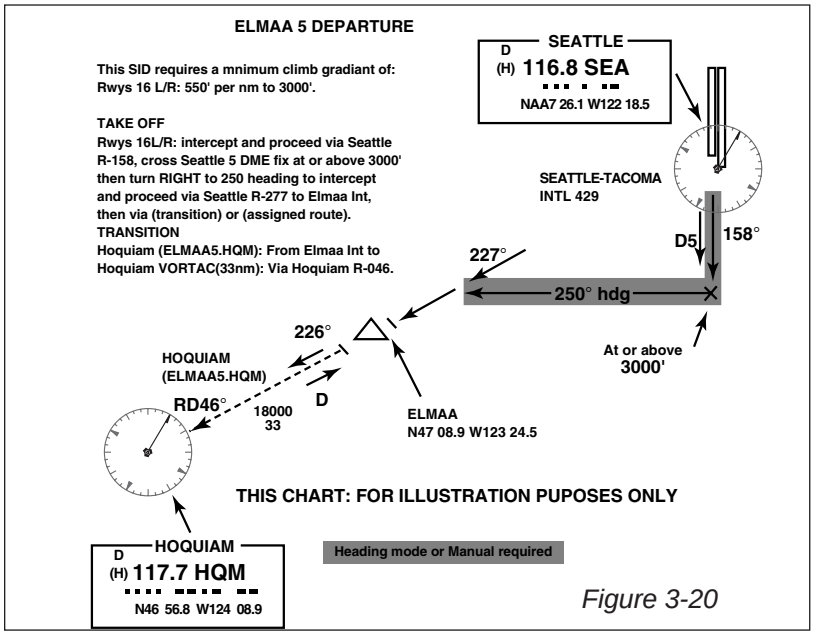


Figure 3-20

Overfly then Intercept Procedures

For procedures that require over-flying a waypoint (Figure 3-21a), then a turn to intercept a course to the next waypoint, follow these operational requirements for the example following:

1. Prior to departure, when the first waypoint is designated fly-over, select **MAN** leg change mode on NAV Page 1 and press **ENTER**.
2. Select the FMS as the NAV source.
3. Accurately fly the runway course or heading.
4. Immediately after passing **ZH582**, do a Direct To **ZH554**, enter 255 in the **DTK** field on NAV Page 1 and press **ENTER**.

NOTE: This is known as the FMS Pseudo Vortac procedure.

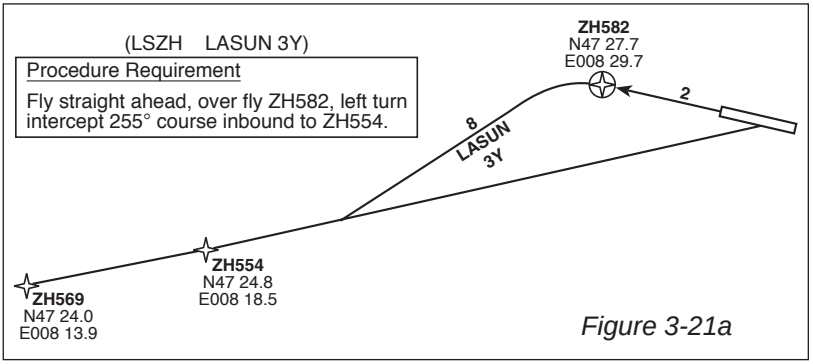


Figure 3-21a

Overfly then DIRECT TO Procedures

For procedures that require over-flying a waypoint (Figure 3-21b), then a Direct To the next waypoint, follow these operational requirements for the example following:

1. Prior to departure, select **MAN** leg change mode on NAV Page 1 and press **ENTER**.
2. Select the FMS as the NAV source.
3. Accurately fly the runway course or heading.
4. Immediately after passing **WW166**, press the ⊕ key, cursor over **BRKNB** and press **ENTER**.

NOTE: This is known as the FMS Direct TO procedure.

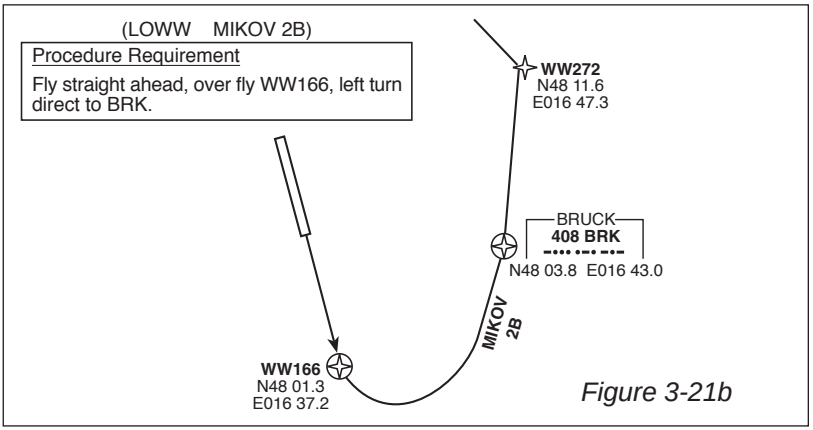


Figure 3-21b

The following procedures allow the pilot to automatically add waypoints stored in the database, as part of a SID, STAR, APPROACH, or Enroute Airway, to either a Stored or Active Flight Plan. These procedures provide an abbreviated method of waypoint entry, eliminating the need to enter individual waypoint identifiers for SIDs, STARs, APPROACHes and Airways.

NOTE: When a SID, STAR, APPROACH or Enroute Airway is added to an existing flight plan, duplicate waypoints may occur. To avoid an inconsistent flight plan and resulting map display, it may be necessary to delete any duplicate waypoints. Also, the routings and coordinates must be verified by the operator. These procedures must not be used in lieu of charts.

Due to the way the GNS-XL database is structured, waypoints must have unique identifiers. However, some duplicate identifiers exist for more than one waypoint location. These waypoints are primarily located on APPROACHES, SIDS and STARS. In these cases the waypoint identifiers are renamed in the database as a 6 character identifier. Two naming conventions are used, one for four character identifiers and one for five character identifiers.

Four character waypoints have the first four characters but add the last two characters of the ICAO airport identifier as shown in the following example:

MA11 at KPRC becomes MA11**RC** in the database.

Five character waypoints have the first five characters but add the last character of the ICAO airport identifier as shown in the following example:

MA27L at KOAK becomes MA27L**K** in the database.

ENTERING A SID ON THE ACTIVE FPL

NOTE: These procedures may also be used with a stored flight plan.

1. **FPL** Key - DEPRESS to display Active **FPL** Page.
2. Line Select Key - DEPRESS to position cursor over the **DEPART?** field (Figure 3-22).



Figure 3-22

3. **ENT** Key - DEPRESS to display **DEPARTURE** Page.

4. **DEPARTURE** Airport Identifier - VERIFY or INSERT valid ident.

NOTE: If the first waypoint on the Flight Plan is an airport, the Departure ident prefills and the cursor is positioned over the first SID identifier on the list.

*If the first waypoint on the Flight Plan is a runway, the **RUNWAY** field also prefills and the cursor is over the first **SID** identifier on the list.*

*If there are no SIDs associated with the Departure Airport, the message **"NO SIDS AVAILABLE"** appears and the ident field flashes. Depress the **FPL** Key to return to the Active Flight Plan.*

5. Line Select Key - DEPRESS to position the cursor over the desired SID, if required. (Figure 3-23)

6. **ENT** Key - DEPRESS to select **SID.**

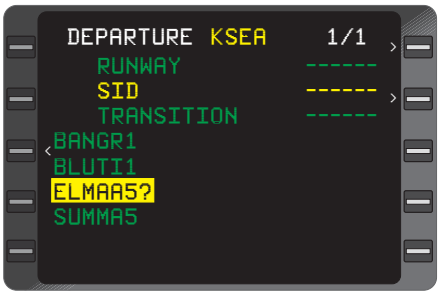


Figure 3-23

*NOTE: Cursor moves to the first **TRANSITION** identifier on the list. The **TRANSITION** field is highlighted in yellow.*

7. Line Select Key - DEPRESS to position cursor over the desired **TRANSITION,** if required. (Figure 3-24)

8. **ENT** Key - DEPRESS to select **TRANSITION.**



Figure 3-24

*NOTE: If the **SID** and **TRANSITION** are runway dependent, and a runway has not prefilled, the cursor moves to*

*the first runway on the **RUNWAY** identifier list and **RUNWAY** field is highlighted in yellow. See Figure 3-25. If runway is not required, proceed to Step 11.*

9. Line Select Key - DEPRESS to position cursor over the desired runway.
10. **ENT** Key - DEPRESS to select **RUNWAY.**
11. Departure **SID** Waypoints - REVIEW (Figure 3-26), then DEPRESS the **ENT** Key to select the SID and insert it into Active Flight Plan. The display will automatically return to the **ACTIVE FLIGHT PLAN** Page.



Figure 3-25

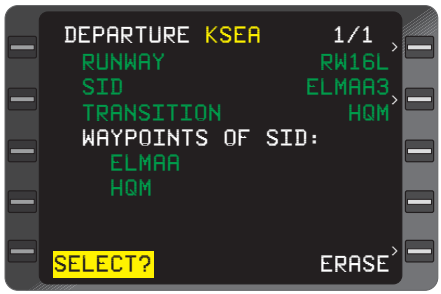


Figure 3-26

NOTE: If SID is added to a stored flight plan this display will return to the stored flight plan page after SID is selected.

*NOTE: **SID** waypoints appear indented from other waypoints in a Flight Plan that are not part of a procedure. (SID, STAR, APPROACH)*

REVIEWING A SID FROM ANY STORED FPL OR THE ACTIVE FPL PAGE

1. Line Select Key - DEPRESS to position cursor over the **DEPART** field on the **FLIGHT PLAN** Page.
2. **ENT** Key - DEPRESS to review **SID** (Figure 3-27).
3. **BACK** Key - DEPRESS to return to Flight Plan Page.



Figure 3-27

*NOTE: **SELECT** will not appear as an option since a **SID** already exists in the Flight Plan.*

EDITING A SID FROM ANY STORED FPL OR THE ACTIVE FPL PAGE

1. Line Select Key - DEPRESS to position cursor over the **DEPART** field on the **FLIGHT PLAN** Page.
2. **ENT** Key - DEPRESS.
3. Line Select Key adjacent to **SID** field - DEPRESS to position cursor over the first **SID** identifier on the list.



Figure 3-28

*NOTE: A list will only appear if the **TRANSITION/ RUNWAY** are compatible with other **SID**s. (Figure 3-28)*

4. Line Select Key adjacent to the **TRANSITION** field - DEPRESS to position cursor over the current **TRANSITION** waypoint on the list. (Figure 3-29)
5. Line Select Key - DEPRESS to position the cursor over the desired **TRANSITION.** (Figure 3-30)



Figure 3-29

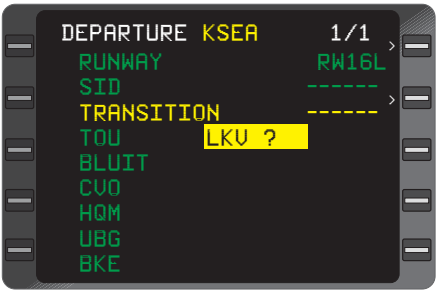


Figure 3-30

6. **ENT** Key - DEPRESS to select desired **TRANSITION.** The system will automatically load the compatible SID associated with the selected **TRANSITION.** (Figure 3-31)

7. **ENT** Key - DEPRESS to select a new **SID** and insert the new **SID** into the flight plan.

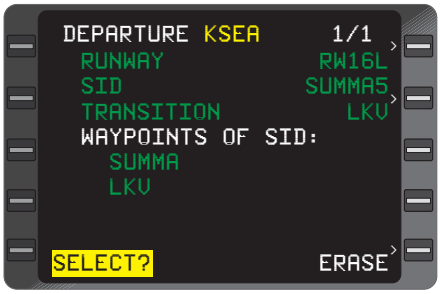


Figure 3-31

*NOTE: The **RUNWAY** can also be edited without changing the original **SID** if the SID/TRANSITION are compatible. This is done by pressing the Line Select Key adjacent to the **RUNWAY** field. Press the Line Select Key to position the cursor over the desired **RUNWAY**. Press **ENT** to load the desired **RUNWAY** on the **SID.***

8. **ENT** Key - DEPRESS to select the edited **SID** as displayed and insert it into the flight plan.

NOTE: Look carefully at the flight plan to see if any waypoints are out of sequence. Delete waypoints as necessary.

ERASING A SID FROM ANY STORED FPL OR THE ACTIVE FPL PAGE

1. Line Select Key - DEPRESS to position cursor over **DEPART** field on the Flight Plan Page.

2. **ENT** Key - DEPRESS.

3. Line Select Key - DEPRESS to position cursor over **ERASE?** (Figure 3-32).

4. **ENT** Key - DEPRESS to erase **SID** and return to Flight Plan page.

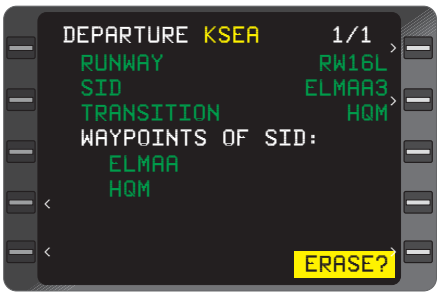


Figure 3-32

ADDING OR DELETING WAYPOINTS WITHIN A SID

*NOTE: When a **SID** is modified by adding or deleting waypoints, the sequence of waypoints is no longer identified as a **SID.***

To Add a Waypoint

1. Line Select Key - DEPRESS to position cursor over the **SID** waypoint identifier that will follow the new entry on the Flight Plan page. See Figure 3-33.
2. Waypoint Ident - INSERT.
3. **ENT** Key - DEPRESS twice.



Figure 3-33

*NOTE: The previously indented **SID** waypoints move over one space to the left on the screen and are treated as normal waypoints in the Flight Plan. (Figure 3-34)*



Figure 3-34

To Delete a Waypoint

4. Line Select Key - DEPRESS to position the cursor over the waypoint to be deleted on the Flight Plan page.
5. **BACK** Key - DEPRESS. A **DELETE?** prompt will appear adjacent to the waypoint to be deleted.
6. **ENT** Key - DEPRESS. The waypoint will be deleted and the waypoints of the SID will be treated as non-procedure waypoints in the flight plan.

ENTERING AN AIRWAY FROM ANY STORED FPL OR THE ACTIVE FPL PAGE

Enroute Airways include high altitude jet routes and low altitude and colored airways.

1. Line Select Key - DE-PRESS to position cursor directly below the starting waypoint of the desired airway on the Flight Plan page. (Figure 3-35)

2. Airway ident - INSERT. Use:

 Option 1 if the destination waypoint is unknown.

 Option 2 to enter the known destination waypoint.



Figure 3-35

Option 1

a. # Key - DEPRESS, then enter the airway identifier. (Figure 3-36)

b. **ENT** Key - DE-PRESS. (Figure 3-37)



Figure 3-36

NOTE: If the waypoint above the cursor is not a waypoint on the selected airway, the airway identifier will blink. The appropriate airway or waypoint identifier must be entered.

The Flight Plan should always be checked for duplicate waypoints and the appropriate waypoints deleted.

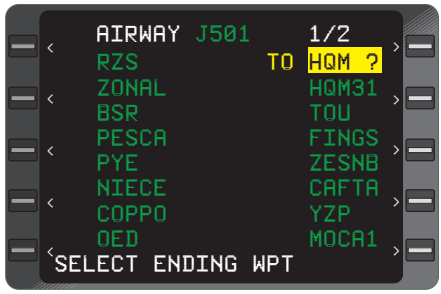


Figure 3-37

c. Line Select Key - DEPRESS to position cursor over the desired destination waypoint. (Figure 3-38). If applicable, use **PRV** and **NXT** Keys to access all airway waypoints pages.

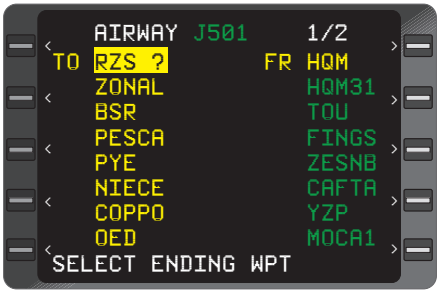


Figure 3-38

*NOTE: As the cursor is moved up or down, **"TO"** will appear next to the cursor and a question mark will follow the ident. The waypoints between the **TO/FROM** waypoints will be displayed in yellow.*

d. After selecting the ending waypoint **(TO)** on the Airway, depress the **ENT** Key to merge the Airway waypoints into the flight plan and return to the **FPL** Page.

*NOTE: If inserting the airway segment into the Flight Plan results in more than 50 waypoints in the stored Flight Plan or 100 waypoints on the Active Flight Plan, the message "**FPL FULL**" will appear.*

NOTE: Look carefully at the flight plan to see if any waypoints are out of sequence. Delete waypoints as necessary.



Figure 3-39

Option 2

a. # Key - DEPRESS then enter the airway identifier.

b. **±** Key - DEPRESS and type destination waypoint. (Figure 3-39)

c. **ENT** Key - DEPRESS. (Figure 3-40)

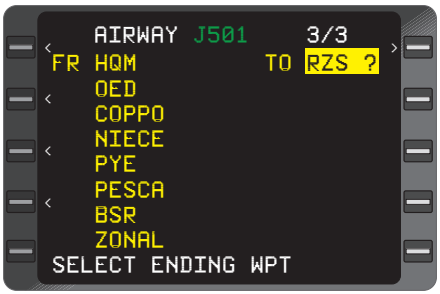


Figure 3-40

NOTE: If the waypoint above the cursor is not a waypoint on the selected airway, the airway identifier will blink and the appropriate airway or waypoint identifier must be entered. If the destination waypoint is not on the airway, the system reverts to Option 1.

d. To change ending waypoint, use the Line Select Key to position cursor over a different destination waypoint. If applicable, use **PRV** and **NXT** Keys to access all airway waypoint pages.

*NOTE: As the cursor is moved up or down, **"TO"** will appear next to the cursor and a question mark will follow the ident. Waypoints between the **TO/FR** waypoints will be displayed in yellow.*

3. **ENT** Key - DEPRESS to merge the airway waypoints into the Flight Plan and return to the Flight Plan Page. (Figure 3-41)



Figure 3-41

*NOTE: If inserting the airway segment into the Flight Plan results in more than 50 waypoints in the stored Flight Plan or 100 waypoints on the Active Flight Plan, the message **"FPL FULL"** will appear.*

4. If applicable, enter additional airway identifiers to chain several airways together.

EDITING AN AIRWAY

Once an airway is merged into the flight plan, waypoints can be added to or deleted from the flight plan on the Flight Plan Page using normal edit procedures.

To add or delete waypoints from a selected segment of the airway, perform the following:

1. Line Select Key - DEPRESS to position cursor over an airway waypoint on the Flight Plan page.
2. # Key - DEPRESS then enter the appropriate airway identifier.

3. **ENT** Key - DEPRESS. (Figure 3-42)

4. Line Select Key - DEPRESS to move the cursor to shorten or lengthen the previously selected segment of the airway. If applicable, use **PRV** and **NXT** Keys to access all airway waypoint pages.

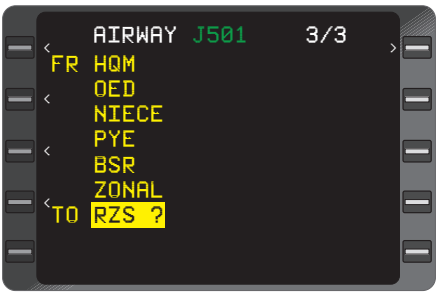


Figure 3-42

5. **ENT** Key - DEPRESS to merge the edited airway segment into the Flight Plan and return to the Flight Plan Page.

ENTERING A STAR OR PROFILE DESCENT ON ANY STORED FPL OR THE ACTIVE FPL PAGE

1. Line Select Key - DEPRESS to position cursor over **ARRIVE?** field on the Flight Plan page (Figure 3-43).

2. **ENT** Key - DEPRESS to display **ARRIVAL** Page (Figure 3-44).

3. **ARRIVAL** Airport Identifier - VERIFY or INSERT valid identifier.



Figure 3-43

*NOTE: If the last waypoint on the Flight Plan is an airport and an Approach is programmed, the **ARRIVAL** airport identifier prefills and the cursor is over the first **TRANSITION** waypoint on the list.*

*If the last waypoint on the Flight Plan is a runway, the **RUNWAY** field also prefills and the cursor is over the first **TRANSITION** waypoint on the list.*



Figure 3-44

*If there are no STARs associated with the Arrival Airport, the message "**NO STARS AVAILABLE**" appears and the arrival airport ident field flashes. Depress FPL Key to return to **ACTIVE FLIGHT PLAN.***

4. **NXT** Key - DEPRESS to view waypoints on subsequent pages if desired.

5. Line Select Key - DEPRESS to position cursor over the desired **TRANSITION.** (Figure 3-45)

6. **ENT** Key - DEPRESS to select **TRANSITION.**

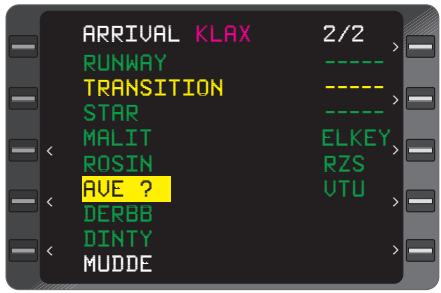


Figure 3-45

*NOTE: The **STAR** field turns yellow and the cursor is over the first identifier on the STAR list.*

7. Line Select Key - DEPRESS to position cursor over the desired **STAR.** See Figure 3-46.

8. **ENT** Key - DE-PRESS to select **STAR.**



Figure 3-46

*NOTE: If the **STAR** and **TRANSITION** are runway dependent, and a runway has not prefilled, the cursor moves to the first **RUNWAY** identifier on the runway list and the runway field is displayed in yellow. If a runway is not required, proceed to Step 11.*

9. Line Select Key - DEPRESS to position cursor over the desired **RUNWAY** on the runway list.

10. **ENT** Key - DEPRESS to select **RUNWAY.**

11. Arrival **STAR** Waypoints - REVIEW (Figure 3-47), then DEPRESS **ENT** Key to insert **STAR** into Active Flight Plan and return to the **ACTIVE FLIGHT PLAN** Page.

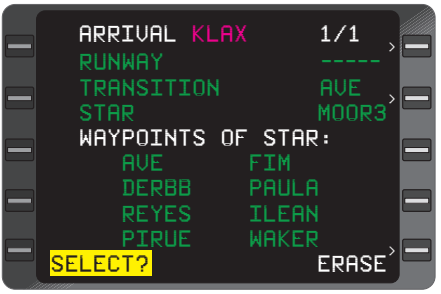


Figure 3-47

NOTE: Look carefully at the flight plan to see if any waypoints are out of sequence. Delete waypoints as necessary.

***STAR** waypoints appear indented from the other waypoints on a Flight Plan that are not part of a procedure. (SID, STAR, or APPROACH)*

REVIEWING A STAR FROM A STORED FPL OR THE ACTIVE FPL PAGE

1. Line Select Key - DEPRESS to position cursor over the **ARRIVE** field on the **FLIGHT PLAN** Page.
2. **ENT** Key - DEPRESS to review **STAR.** (Figure 3-48)
3. **BACK** Key - DEPRESS to return to **FLIGHT PLAN** Page.

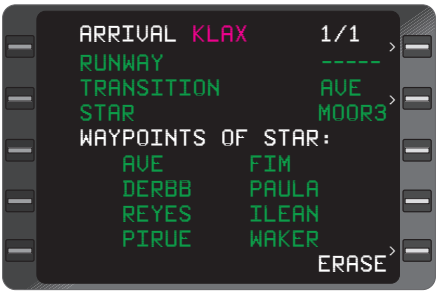


Figure 3-48

NOTE: SELECT will not appear as an option since a STAR already exists in the Flight Plan.

EDITING A STAR FROM A STORED FPL OR THE ACTIVE FPL PAGE

1. Line Select Key - DEPRESS to position cursor over the **ARRIVE** field on the **FLIGHT PLAN** Page.
2. **ENT** Key - DEPRESS.
3. Line Select Key - DEPRESS twice to position the cursor over the **STAR** field. This will erase the current **TRANSITION.**

NOTE: A list will appear with other available STARs.

4. Line Select Key - DEPRESS to position cursor over the desired **STAR.**

5. **ENT** Key - DEPRESS to select desired **STAR.**

*NOTE: Cursor moves to the first waypoint of the **TRANSITION** list and the **TRANSITION** field is displayed in yellow.*

6. Line Select Key - DEPRESS to position the cursor over the desired transition waypoint.

7. **ENT** Key - DEPRESS to select the **TRANSITION.** If the **STAR** is not runway dependent proceed to Step 10.

8. Line Select Key - DEPRESS to position the cursor over the desired runway on the **RUNWAY** list.

*NOTE: The **RUNWAY** can also be edited without changing the original **SID** if the **SID/TRANSITION** are compatible. This is done by pressing the Line Select Key adjacent to the **RUNWAY** field. Position the cursor over the desired **RUNWAY.** Press **ENT** to load the desired **RUNWAY** on the **SID.***

9. **ENT** Key - DEPRESS to select the **RUNWAY.**

10. Arrival **STAR** Waypoints - REVIEW, then DEPRESS **ENT** Key to insert **STAR** into Active Flight Plan and return to the **ACTIVE FLIGHT PLAN** Page.

ERASING A STAR FROM A STORED FPL OR THE ACTIVE FPL PAGE

1. Line Select Key - DEPRESS to position cursor over **ARRIVE** field on the **FLIGHT PLAN** Page.

2. **ENT** Key - DEPRESS.

3. Line Select Key - DEPRESS to position cursor over **ERASE?** (Figure 3-49)

4. **ENT** Key - DEPRESS to erase **STAR** and return to **FLIGHT PLAN** Page.



Figure 3-49

ADDING WAYPOINTS WITHIN A STAR

NOTE: When a STAR is modified by adding or deleting waypoints, the sequence of waypoints is no longer identified as a STAR.

The following may be accomplished from any stored flight plan or the **ACTIVE FPL** Page.

1. Line Select Key - DEPRESS to position cursor over the **STAR** waypoint identifier that will follow the new entry on the Flight Plan page. (Figure 3-50)
2. Waypoint Ident - INSERT.
3. **ENT** Key - DEPRESS twice.



Figure 3-50

NOTE: The previously indented STAR waypoints move over one space to the left on the screen and are treated as normal waypoints in the Flight Plan. (Figure 3-51)



Figure 3-51

DELETING WAYPOINTS OF A STAR

1. Line Select Key - DEPRESS to position cursor over the **STAR** waypoint identifier to be deleted on the Flight Plan page.
2. **BACK** Key - DEPRESS. A **DELETE?** prompt will appear adjacent to the waypoint to be deleted.
3. **ENT** Key - DEPRESS. The waypoint will be erased and the waypoints of the STAR will move left one space. These waypoints will be treated as non-procedure waypoints in the flight plan.

ENTERING AN APPROACH ON A STORED FPL OR THE ACTIVE FPL PAGE

1. Line Select Key - DEPRESS to position cursor over **APPROACH?** field on the **ACTIVE FPL** page. (Figure 3-52)

2. **ENT** Key - DEPRESS to display **APPROACH** Page. (Figure 3-53)

3. **APPROACH** Airport identifier - VERIFY or INSERT valid ident.

*NOTE: If there are no APPROACHes associated with the Approach Airport, the message **"NO APPROACH AVAIL"** appears and the airport ident field flashes. Depress **FPL** Key to return to Active Flight Plan.*

4. Line Select Key - DEPRESS to position cursor over the desired **RUNWAY** on the runway list. (Figure 3-54)

*NOTE: If a **CIRCLING** Type Approach is desired, use line select to display type. Go to step 6.*

5. ENT Key - DEPRESS to select **RUNWAY.** If a valid runway has been selected, the cursor moves to the first approach **TYPE**.



Figure 3-52

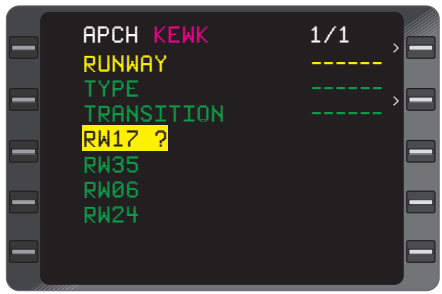


Figure 3-53

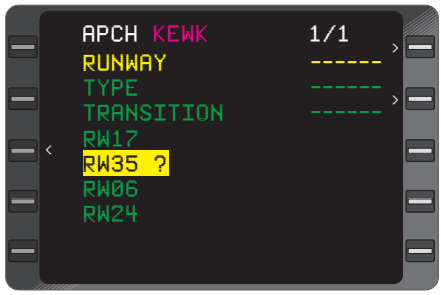


Figure 3-54

6. Line Select Key- DEPRESS to position cursor over the desired Approach **TYPE** if required.

7. **ENT** Key - DEPRESS to select Approach **TYPE**. (Figure 3-55)

*NOTE: If there is only one type of approach available the system automatically loads the approach **TYPE** and the cursor moves over the WPT in the transition list. Go to Step 8.*

*NOTE: If the runway selected on the Approach Page differs from the runway dictated by the STAR, **"SEL RWY FROM STAR PG"** is displayed at the bottom of the screen.*

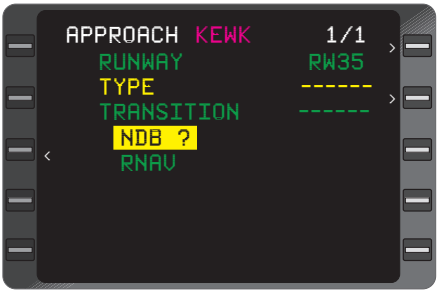


Figure 3-55

8. Line Select Key - DEPRESS to position cursor over the desired **TRANSITION** if required. (Figure 3-56) If there is only one transition for the desired approach the system automatically loads the transition and the WPTs of the approach are displayed. Go to step 10.

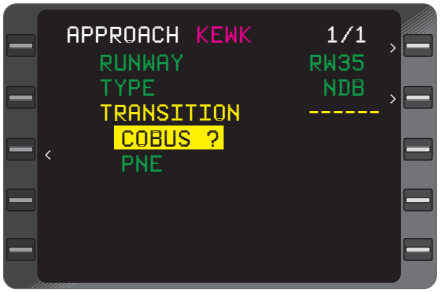


Figure 3-56

9. **ENT** Key - DEPRESS to select **TRANSITION.**

The system will identify the following waypoints of an approach:

IAF - Indicates the initial approach fix.

ARC - DME Arc end point.

PT - A Procedure Turn will commence at that waypoint.

HP - A Holding Pattern is programmed at that waypoint.

FCF - Final Approach Course Alignment Fix

FAF - The Final Approach Fix.

MAP - The Missed Approach Point.

10. Approach Waypoints - REVIEW (Figure 3-57), then DEPRESS **ENT** Key to insert **APPROACH** into Active Flight Plan and return to the **ACTIVE FLIGHT PLAN** Page.

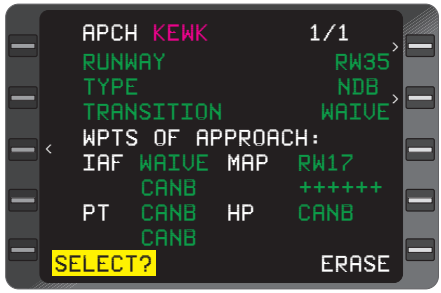


Figure 3-57

REVIEWING AN APPROACH FROM A STORED FPL OR THE ACTIVE FPL PAGE

1. Line Select Key - DEPRESS to position cursor over the **APPROACH** field on the **FLIGHT PLAN** Page.
2. **ENT** Key - DEPRESS to review **APPROACH** (Figure 3-58)
3. **BACK** Key - DEPRESS to return to **FLIGHT PLAN** Page.

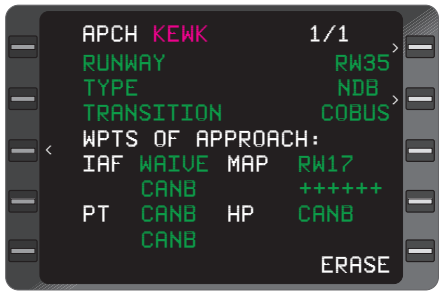


Figure 3-58

NOTE: SELECT will not appear as an option since an APPROACH already exists in the Flight Plan.

EDITING AN APPROACH FROM A STORED FPL OR THE ACTIVE FPL PAGE

1. Line Select Key - DEPRESS to position cursor over the **APPROACH** field on the **FLIGHT PLAN** Page.
2. **ENT** Key - DEPRESS to display **APPROACH** Page.

The **RUNWAY, TYPE**, or **TRANSITION** may be edited by pressing the Line Select Key next to the field to be edited. That field will turn from green to yellow and the previous information will turn to dashes. Alternate options may be available depending on the information in the remaining two fields.

The most efficient way to edit an approach procedure is to change the **RUNWAY, TYPE,** and **TRANSITION** fields to dashes (------).

1. Line Select Key (adjacent to **RUNWAY** field) - DEPRESS to change the field to dashes.

2. Line Select Key (adjacent to **TYPE** and **TRANSITION** fields) - DEPRESS to change the field to dashes.

Using the same Line Select Keys, obtain a complete list of **RUNWAYS, TYPES**, and **TRANSITIONS.** Use the appropriate Line Select Keys to select the desired data from each list.

3. **ENT** Key - DEPRESS to enter the selected data from each list. When all the fields have been filled.

4. **ENT** Key - DEPRESS to select the new approach data, insert it into the flight plan, and return to the Flight Plan Page.

NOTE: Look carefully at the flight plan to determine if any waypoints are out of sequence and delete waypoints as necessary.

*When an **APPROACH** is modified by adding or deleting waypoints the sequence of waypoints is no longer identified as an **APPROACH** and the system will not enter the Approach Mode. An **APPROACH CANCELED** message will be displayed anytime a waypoint is deleted, added to an approach procedure on the Active Flight Plan, or when a Direct To the MAP is initiated..*

ERASING AN APPROACH FROM A STORED FPL OR THE ACTIVE FPL

NOTE: Erasing an Approach also erases the current destination airport identifier. This procedure should be used when an approach at a different airport is desired.

1. Line Select Key - DEPRESS to position cursor over **APPROACH** field on the **FLIGHT PLAN** Page.

2. **ENT** Key - DEPRESS to display **APPROACH** Page.

3. Line Select Key - DEPRESS to position cursor over **ERASE?** (Figure 3-59)

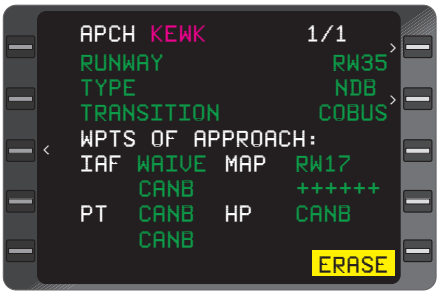


Figure 3-59

4. **ENT** Key - DEPRESS to erase **APPROACH** and return to the **FLIGHT PLAN** Page.

DELETING AN APPROACH WAYPOINT

1. Display the appropriate **FPL** Page.
2. Line Select Key - DEPRESS to position cursor over the **APPROACH** waypoint identifier to be deleted.
3. **BACK** Key - **DEPRESS.** A **DELETE?** prompt will appear adjacent to the waypoint.
4. **ENT** Key - DEPRESS.

*NOTE: When an **APPROACH** is modified by adding or deleting waypoints (including waypoints between the "fence" and the Missed Approach Procedure waypoint), the sequence of waypoints is no longer identified as an (APPROACH) and the system will not enter the Approach Mode. An (**APPROACH CANCELED)** message will be displayed anytime a waypoint is deleted or added to an **APPROACH** procedure on the Active Flight Plan.*

*NOTE: Anytime a Direct To the MAP is performed and an approach is either armed or active, an **APPROACH CANCELED** message will appear. The approach functions will be disabled and the CDI scaling will return to the **TERMINAL** sensitivity of 1NM full scale deflection.*

USING A STAR AND AN APPROACH IN THE SAME FLIGHT PLAN

Since both the Arrival (STAR) and Approach procedures allow for entry of **AIRPORT** and **RUNWAY,** the following rules apply.

- Changing the **AIRPORT** on the **ARRIVAL** Page, and selecting an associated **STAR,** automatically erases the **APPROACH** procedure.
- Changing the **AIRPORT** on the **APPROACH** Page, and selecting an associated Approach, automatically erases the **STAR** procedure.
- Changing the **RUNWAY** on the **ARRIVAL** Page, and selecting it, automatically erases the **APPROACH** procedure.
- Changing the **RUNWAY** on the **APPROACH** Page, and selecting it, has no effect on the **STAR** procedure unless the **STAR** is runway dependent.

If the **STAR** is runway dependent, the message **"SEL RWY FROM STAR PG"** (Select **RUNWAY** from **STAR** Page) appears on the **APPROACH** Page. The pilot must return to the **ARRIVAL** Page to change the **RUNWAY** for the **STAR,** before changing the **RUNWAY** on the **APPROACH** Page.

SELECTING A COMPANY ROUTE AND ADDING IT TO THE ACTIVE FLIGHT PLAN

1. Display the **COMPANY ROUTES** Page (automatically after initialization, or by paging the **FPL** pages).

*NOTE: If the data base contains company routes, the first page displayed after system initialization will be the **COMPANY ROUTES** page in lieu of the **FLIGHT PLAN LIST** page. If both AFIS and Company Routes are present, the **COMPANY ROUTES** page is displayed first.*

*NOTE: Typically, the **COMPANY ROUTES** page will display the location entered on the initialization page (if available) in the Origin field, with the cursor over both the Origin and Destination field, ready for entry of the Destination.*



Figure 3-59a

2. Line Select Key LSR2 - If you desire to change the Origin entry, DEPRESS to position cursor over only **ORIGIN** field on the **COMPANY ROUTES** page, and type in desired identifier. (Figure 3-59a) If the cursor is over both fields, and the Origin is correct, proceed to the next step. (Figure 3-59b)



Figure 3-59b

3. **DESTINATION** identifier - VERIFY or INSERT valid ident. (Figure 3-59b)

4. **ENT** Key - DEPRESS. (Figure 3-59c) If the pair is valid and has only one VIA, the ACTIVE FLIGHT PLAN page is now displayed with the waypoints of the pair added.



Figure 3-59c

*NOTE: If the pair is not valid, the **COMPANY ROUTES** page will remain, and a **ROUTE NOT FOUND** message will be displayed. (Figure 3-59d) If the route is valid, but the Active FPL is full, an **ACTIVE FPL FULL** message is displayed. (Figure 3-59e) A **WPT MEM FULL MESSAGE** will be displayed if the waypoint memory is full.*

NOTE: The Company Route can be selected either by the preceding method using an Origin/Destination city pair, or by selecting LSK L4 and entering the route number.

5. If the selected city pair has more than one VIA, the first one will be displayed. (Figure 3-59f)
6. Use the **PRV**, **NXT**, or **BACK** keys to scroll through the list of VIAs (Figure 3-59g)
7. **ENT** Key - DEPRESS. The ACTIVE FLIGHT PLAN page is now displayed with the waypoints of the pair added.

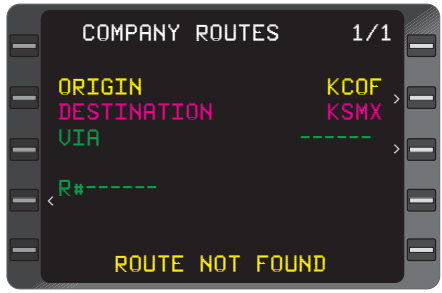


Figure 3-59d



Figure 3-59e

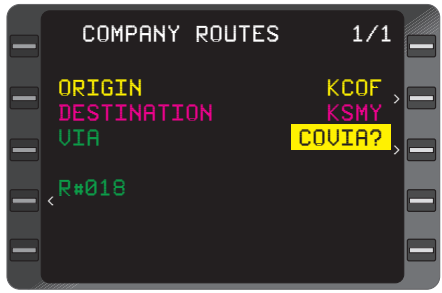


Figure 3-59f

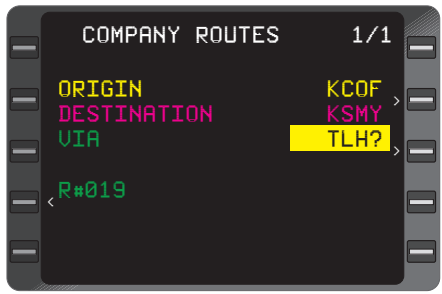


Figure 3-59g

Note: In order to execute approaches with a specific aircraft installation, the installation must meet the standards set forth by the governing certification agency. Consult the Aircraft Flight Manual Supplement for specific limitations.

EXECUTING APPROACHES

WARNING: When entering PTs or HP airspace at high speed the FMS may not constrain the airplane from violating maneuvering airspace. Pilots are responsible for procedural compliance.

When the aircraft is within 30NM of the airport, the system will go into the Approach Armed mode. The CDI sensitivity will change from 5.0NM full scale deflection to 1.0NM full scale deflection. At this point the aircraft may bank slightly due to increased roll steering gains. Anytime the TO waypoint is part of an Approach Procedure, the **SXTK** field is disabled so that no parallel course can be entered.

The system is capable of executing GPS, GPS Overlay, NDB, RNAV, CIRCLING, and VOR approaches only. No LOC, ILS or MLS capability is available.

If **RAIM** is not available at 2NM from the FAF, an **APPROACH WARN** message will appear on the **SYSTEM MESSAGES** Page. Also, the HSI flag will be set invalid. At this point the appropriate missed approach procedures should be executed. The system will remain in the Approach Mode and the discrete **APPROACH** annunciator will remain illuminated until the HSI is set valid. To set the HSI valid, cancel the Approach on the **SYSTEM MESSAGES** Page by pressing the **ENT** Key.

The system will not display any interim waypoints between the **FAF** and the **MAP**, even though a waypoint may be shown on the approach plate. **The system may not give vertical guidance to the interim waypoint. Pilots are responsible for procedural compliance.**

*NOTE: If the **MAP** is abeam or beyond the threshold, or the approach is a circling approach, no altitude constraints will be displayed at the **MAP** from the database. Constraints may be entered manually.*

When the Approach is flown, the system will provide guidance along the final approach course to the Missed Approach Point.

When initially executing a missed approach procedure, use the FMS Heading Mode or manually fly the procedure to ensure proper track and turn direction.

*NOTE: A "fence" (++++++) separates the Missed Approach Procedure waypoint from the MAP, the last waypoint of the Approach. No Auto Leg change (waypoint sequencing) will occur to waypoints beyond the "fence" (++++++) once the airplane passes the **MAP**.*

*At the **MAP** the pilot must manually or via the HDG Mode maneuver the aircraft to the Missed Approach Procedure waypoint. If, after the missed approach, an approach at a different airport is desired, erase the current approach procedure before selecting a procedure at the new airport. This will insure proper waypoint sequencing on the Active Flight Plan.*

LOADING A GPS/GPS OVERLAY APPROACH

1. **FPL** Key - DEPRESS until the **ACTIVE FPL** Page appears. (Figure 3-60)
2. Line Select Key - DEPRESS to position the cursor over **APPROACH?**
3. **ENT** Key - DEPRESS. APPROACH page is now displayed. (Figure 3-61)
4. Airport Identifier - INSERT or VERIFY.
5. **ENT** Key - DEPRESS twice, if required, to display runway list if not already displayed.

If a circling type approach is desired:

Line Select Key - DEPRESS to position cursor over **TYPE.**



Figure 3-60

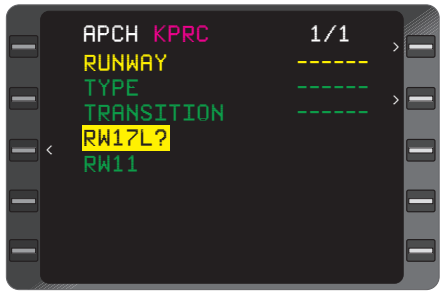


Figure 3-61

ENT Key - DEPRESS to display the **TYPE** list. Proceed to Step 10.

6. Line Select Key - DEPRESS to position cursor over desired runway.
7. **ENT** Key - DEPRESS.
8. **TYPE** - SELECT if required.
9. **ENT** Key - DEPRESS.
10. **TRANSITION** - SELECT if required.
11. **ENT** Key - DEPRESS.

12. Approach Waypoints - REVIEW.
13. **ENT** Key - DEPRESS **ACTIVE FPL** Page is displayed. VERIFY the approach appears as selected.
14. Waypoint Sequencing - Edit, if required, based on assigned route.

EXECUTING A GPS/GPS OVERLAY APPROACH

NOTE: To fly a full procedure DME ARC or Procedure Turn, either coupled or using own navigation, follow the FMS and EFIS/Instrument displays.

USING RADAR VECTORS TO FINAL APPROACH COURSE

1. **FPL** key - DEPRESS to display the **ACTIVE FPL** Page. (Figure 3-62)
2. Approach and Waypoint Sequencing - VERIFY they appear as selected.
3. **MSG** Key - VERIFY approach is armed within 30NM of the airport and the HSI scaling output has changed to **TRMNL** on **NAVIGATION** Page 2.
4. FMS Mode - SELECT or VERIFY the appropriate mode for guidance if required.
5. Flight Director or Autopilot - ENGAGE the appropriate mode if required.
6. **HDG** Key - DEPRESS to display the **HEADING VECTOR** Page. (Figure 3-63)
7. Heading - INSERT as assigned by ATC.



Figure 3-62



Figure 3-63

8. **ENT** Key - DEPRESS twice to engage Heading Select mode. (Figure 3-64)

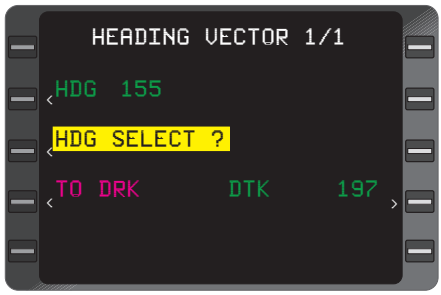


Figure 3-64

After receiving the final intercept vector from ATC:

9. **HDG** Key - DEPRESS to display the **HEADING VECTOR** Page. (Figure 3-65)
10. **ENT** Key - DEPRESS.
11. **BACK** Key - DEPRESS to display **INTERCEPT?**
12. **ENT** Key - DEPRESS cursor moves to the **TO** field.
13. **BACK** Key - DEPRESS until the FAF waypoint is displayed.

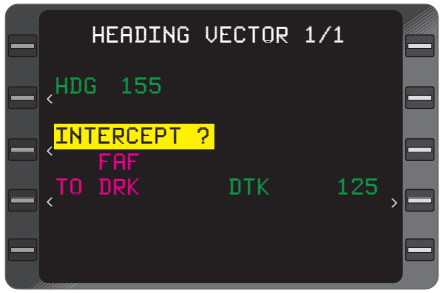


Figure 3-65

14. **ENT** Key - DEPRESS cursor moves to the **DTK** field.
15. Final Approach Course - INSERT if a Procedure Turn type approach or VERIFY if any other type approach.
16. **ENT** Key - DEPRESS twice.
17. CDI Display - VERIFY the HSI course needle slews to the final approach course or manually select the course.
18. Approach Annunciator - When over the FAF, VERIFY annunciation and the HSI scaling output has changed to **APPR** on **NAVIGATION** Page 2.

USING OWN NAVIGATION - NO DME ARC

1. **FPL** Key - DEPRESS to display the **ACTIVE FPL** Page. (Figure 3-66)
2. Approach and Waypoint Sequencing - VERIFY they appear as selected.
3. **MSG** Key - VERIFY approach is armed within 30NM of the airport and the HSI scaling output has changed to **TRMNL** on **NAVIGATION** Page 2.



Figure 3-66

4. FMS Mode - SELECT or VERIFY the appropriate mode for guidance.
5. Flight Director or Autopilot - ENGAGE the appropriate mode.
6. Waypoints and HSI Course - VERIFY proper sequencing during the approach.
7. Approach Annunciator - When over the FAF, VERIFY annunciation and the HSI scaling output has changed to **APPR** on **NAVIGATION** Page 2.

PROCEDURE TURN

The following is a brief description of the screen displays typically seen while executing a Procedure Turn.

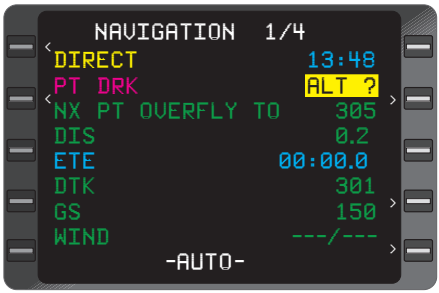


Figure 3-67

As the aircraft approaches the **PT** waypoint, a message is displayed on the fourth line of the CDU indicating the next action the aircraft will take. This message is displayed 30 seconds prior to the event and disappears when the action is initiated. Figure 3-67 indicates the aircraft is flying **DIRECT** to **DRK** where a Procedure Turn **(PT)** will take place. Line four indicates the aircraft will turn to a heading of 305° upon reaching **DRK.** While flying the Procedure Turn, the **TO DRK** will change to **TO INTCPT.** When the Procedure Turn is completed, and the aircraft is inbound, the **TO INTCPT** field changes to **TO** (the FAF).

NOTE: When flying the approach on a transition that specifies NoPT and a "PT" waypoint is depicted on the flight plan, it will be necessary to do a DIRECT TO the next waypoint beyond the "PT" waypoint to avoid flying the Procedure Turn.

NOTE: When a Procedure Turn is initiated, the outbound course is displayed on the ***NAVIGATION 1*** *Page. If the course arrow does not automatically slew to the outbound course, it must be manually set to the outbound course so that the CDI sensing is correct.*

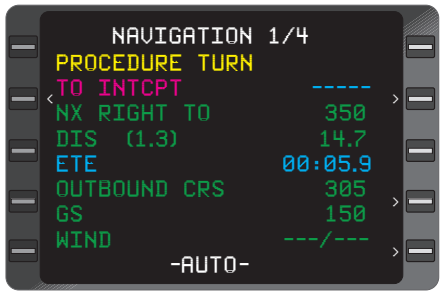
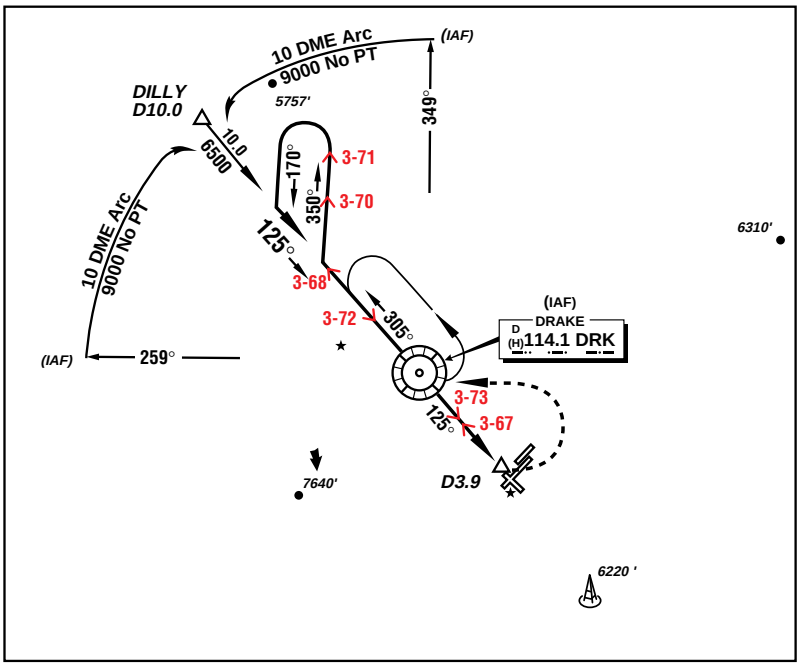


Figure 3-68

Figure 3-68 indicates a right turn to 350° is upcoming.

See the following diagram and Figures 3-70 through 3-73 as the aircraft sequences through the turn.



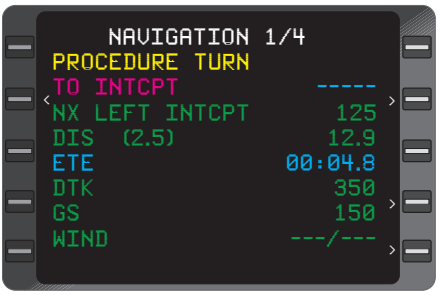


Figure 3-70

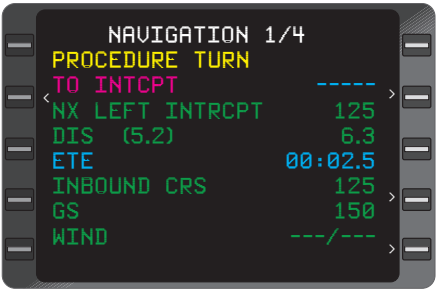


Figure 3-71

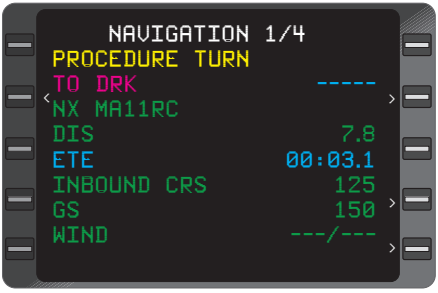


Figure 3-72

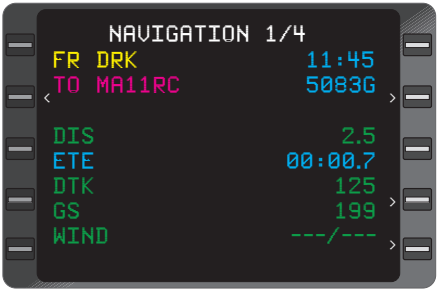


Figure 3-73

*NOTE: If aircraft is configured for dual systems no **XFILL?** prompt will be displayed during a **PT** even if dissimilar data exists in each system.*

*Estimated Time Enroute **(ETE)** that is dispayed after crossing the IAF on the procedure turn is the time from the aircraft's present position to where the airplane intercepts the final approach course inbound (**INTCPT**). After crossing this intercept point, the ETE shown will be from the airplane's present position to the FAF.*

DIS that is displayed after crossing the IAF on the procedure turn is the distance from the aircraft's present position to where the airplane intercepts the final approach course inbound (INTCPT). The **DIS** shown in parentheses is the straight-line distance from the aircraft's present position to the procedure turn fix.

NOTE: The bearing and bearing distance are with respect to the procedure turn fix.

After crossing this intercept point the **DIS** shown will be from the airplane's present position to the FAF and the **DIS** in parentheses will be removed. **TO** the FAF will be displayed at this time having changed from **TO INTCPT** on NAV Page1.

USING RADAR VECTORS TO INTERCEPT A DME ARC

1. **FPL** Key - DEPRESS to display the **ACTIVE FPL** Page. (Figure 3-74)
2. Approach and Waypoint Sequencing - VERIFY they appear as selected.
3. **MSG** Key - VERIFY approach is armed within 30NM of the airport and the HSI scaling output has changed to **TRMNL** on **NAVIGATION** Page 2.



Figure 3-74

4. FMS Mode - SELECT or VERIFY the appropriate mode for guidance.
5. Flight Director or Autopilot - ENGAGE the appropriate mode.

6. **HDG** Key - DEPRESS to display the **HEADING VECTOR** Page. (Figure 3-75)
7. Heading - INSERT as assigned by ATC.
8. **ENT** Key - DEPRESS twice to engage **HDG SELECT** mode.



Figure 3-75

After receiving ARC intercept vector from ATC:

9. **HDG** Key - DEPRESS to display the **HEADING VECTOR** Page.
10. Heading - INSERT.
11. **ENT** Key - DEPRESS.
12. **BACK** Key - DEPRESS to display **INTERCEPT?** (Figure 3-76)
13. **ENT** Key - DEPRESS cursor moves to the **TO** field.
14. **BACK** Key - DEPRESS until the ARC End/Final Approach Course Way-point is displayed.

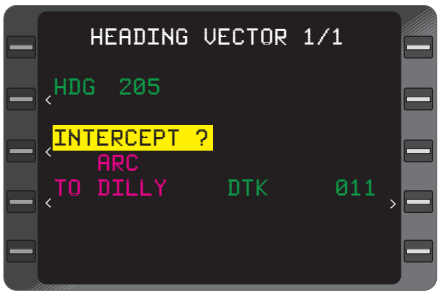


Figure 3-76

NOTE: If an intermediate waypoint exists on the ARC between the ARC beginning point and the ARC end point, the ARC intercept point should be approximated so it can be determined whether the ARC end or intermediate waypoint should be used as the TO waypoint. NO ARC INTERCEPT may be displayed if the wrong waypoint is selected.

15. **ENT** Key - DEPRESS twice (accepts the default **DTK)**.
16. CDI Display - VERIFY course needle is set to the **DTK** shown on the **HEADING VECTOR** Page.
17. Waypoints and HSI Course - VERIFY proper sequencing during the approach.
18. Approach Annunciator - When over the FAF, VERIFY annunciation and the HSI scaling output has changed to **APPR** on **NAVIGATION** Page 2.

USING OWN NAVIGATION TO FLY DME ARC

1. **FPL** Key - DEPRESS to display the **ACTIVE FPL** Page. (Figure 3-77)
2. Approach and Waypoint Sequencing - VERIFY they appear as selected.
3. **MSG** Key - VERIFY approach is armed within 30NM of the airport and the HSI scaling output has changed to **TRMNL** on **NAVIGATION** Page 2.



Figure 3-77

4. FMS Mode - SELECT or VERIFY the appropriate mode for guidance.
5. Flight Director or Autopilot - ENGAGE the appropriate mode.
6. Waypoints and HSI Course - VERIFY proper sequencing during the approach.
7. Approach Annunciator - When over the FAF, VERIFY annunciation and the HSI scaling output has changed to **APPR** on **NAVIGATION** Page 2.

The following is a brief description of the screen displays typically seen flying a DME Arc.

NOTE: Certain EFIS map displays do not support curved lines to draw DME Arcs. In this case the map will only display waypoints up to and including the IAF waypoint at the beginning of the arc. No waypoints will be displayed while on the arc. Once the aircraft has passed the arc end waypoint, the map will display the remaining waypoints of the active flight plan. Although no waypoints will be displayed during the DME Arc Procedure, the FMS page displays will be as depicted in Figures 3-78 through 3-82

*NOTE: If aircraft is configured for dual systems no **XFILL**? prompt will be displayed during a **DME ARC** procedure even if dissimilar data exists in each system.*

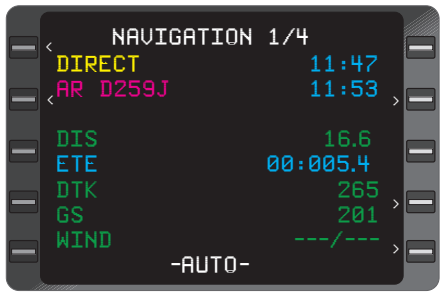


Figure 3-78

As the aircraft approaches the **AR** waypoint, a message is displayed on the fourth line of the CDU indicating the next action the aircraft will take **(NX DME ARC)**. This message is displayed thirty seconds prior to the event and disappears when the action is initiated. Figure 3-78 indicates the aircraft is flying **DIRECT** to **D259J** where the aircraft will begin flying a DME Arc **(AR).**

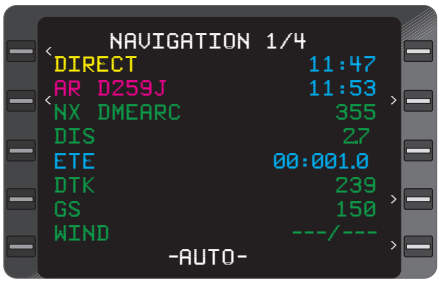


Figure 3-79

Figure 3-79 shows the aircraft is within thirty seconds of intercepting the DME Arc at **D259J.**

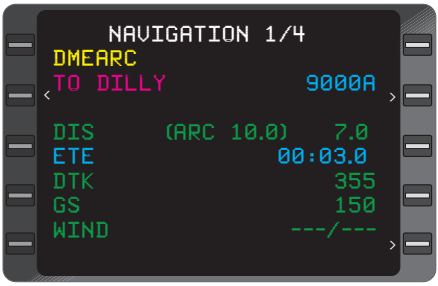


Figure 3-80

*NOTE: The naming convention for ARC waypoints is as follows: **D** indicates DME. **259** indicates the radial from the ARC center NAVAID. **J** indicate the ARC distance. i.e. A=1nm J=10nm.*

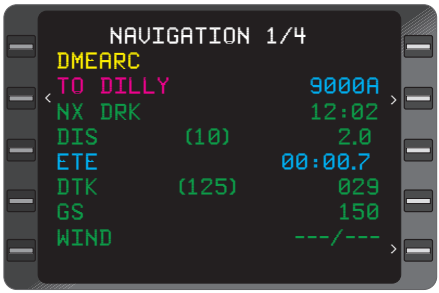


Figure 3-81

Figure 3-80 shows the aircraft is flying the DME Arc to **DILLY. (ARC 10.0)** in the **DIS** field indicates the arc center is 10.0 NM from the aircraft's present position.

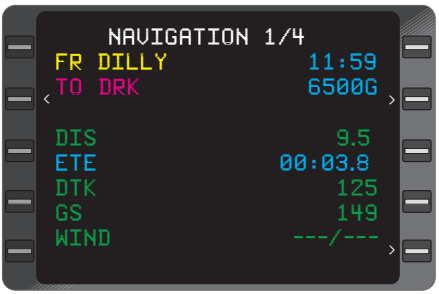


Figure 3-82

*NOTE: Distance **(DIS)** displayed is the distance from the present aircraft position to the TO waypoint.*

*Estimated Time Enroute **(ETE)** is the time around the arc path to the TO waypoint.*

Use one of the following options to sequence to the missed approach waypoint.

OPTION 1, Direct To the Missed Approach Procedure waypoint

1. D Key - DEPRESS. The **DIRECT** Page will be displayed.
2. Line Select Key - DEPRESS to position the cursor over the Missed Approach Procedure waypoint, if required.
3. **ENT** Key - DEPRESS to sequence to the Missed Approach Procedure waypoint.

NOTE: If the direction the airplane will turn is in question and the turn direction may not be in accordance with the missed approach procedure, manually turn the airplane toward the missed approach fix then perform the D to procedure.

OPTION 2, Heading to intercept a course to the Missed Approach Procedure waypoint

1. **HDG** Key - DEPRESS. The **HEADING VECTOR** Page appears with the cursor over the **HEADING** field. Type in the appropriate heading using a preceding **R** or **L** to establish the turn direction (i.e. L150). (Figure 3-83)



Figure 3-83

2. **ENT** Key - DEPRESS. The cursor moves to the Heading Mode field and **HDG SELECT?** is in the cursor. (Figure 3-84)



Figure 3-84

*NOTE: Prior to step 3 the enter key may be pressed with the cursor over **HDG** select field so that the airplane can begin the intercept process. Repeat the procedure from step1 to complete the **HDG** intercept procedure.*

3. **BACK** Key - DEPRESS until **INTERCEPT?** is displayed.

4. **ENT** Key - DEPRESS. The cursor moves to the **TO** field. (Figure 3-85)

5. **BACK** Key - DEPRESS until the Missed Approach Procedure waypoint is displayed.

6. **ENT** Key - DEPRESS. The cursor moves to the **DTK** field. Type in the desired track to be intercepted to the Missed Approach Procedure waypoint. (Figure 3-86)

7. **ENT** Key - DEPRESS TWICE. The **NAVIGATION** Page will be displayed with the **HDG** and **DTK** displayed in yellow. The autopilot may now be re-engaged if required to fly to the Missed Approach Procedure waypoint.



Figure 3-85

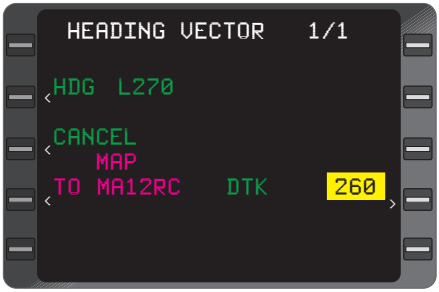


Figure 3-86

It is recommended that the **ETA** field on **NAVIGATION** Page 1 be changed to **ALT** during approach procedures for a display of the altitude constraints at the current TO waypoint. To change the field from **ETA** to **ALT,** perform the following:

1. Line Select Key - DEPRESS to position the cursor over the **ETA** field.

2. **BACK** Key - DEPRESS. **ALT?** will be displayed in the cursor. (Figure 3-87)

3. **ENT** Key - DEPRESS to change the field to altitude.

*NOTE: If no altitude constraint is programmed at the current TO waypoint, the **ALT** field will display dashes.*

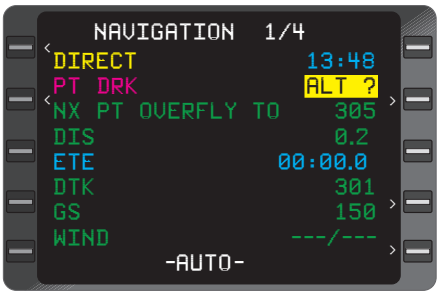


Figure 3-87

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ENROUTE

DIRECT TO - ACTIVE FLIGHT PLAN WAYPOINT

D→ function enables the pilot to fly direct to any lateral waypoint on the Active Flight Plan without reinserting the waypoint identifier.

NOTE: If a Direct To the MAP on the active flight plan is initiated, the selected Approach Procedure will be canceled as indicated by the waypoints of the approach no longer being indented and a MSG.

1. D→ Key - DEPRESS. A **DIRECT TO** Page will appear with the cursor over the current TO waypoint. (Figure 3-88)

2. Line Select Key - DEPRESS to position the cursor over the desired identifier.

*NOTE: Active Flight Plans exceeding 18 waypoints will be continued on subsequent pages. Press D→, **NXT** or **PRV** Key to access remaining waypoints.*

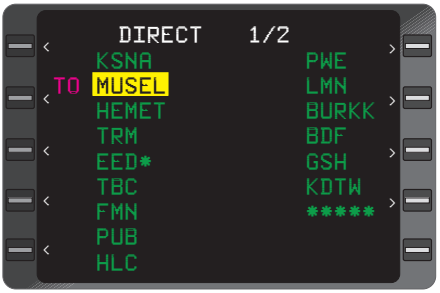


Figure 3-88

3. **ENT** Key - DEPRESS. Display automatically advances to **NAVIGATION** Page 1.

NOTE: The system must compute a turn from a wings level position. If the aircraft is in a turn when the D→ Key pressed, the aircraft will roll to wings level position momentarily. The aircraft will then continue the turn toward the Direct To waypoint.

*If an offset waypoint was selected, an **OFFSET WPT** Page is displayed. Verify data and DEPRESS **ENT.** The **DIRECT** Page is displayed with cursor over the Offset Waypoint. Press **ENT** again **to proceed direct to the WPT.** Display automatically advances to **NAVIGATION** Page 1.*

4. **DIS, DTK** - CHECK.

DIRECT TO - HP WAYPOINT

1. ⊕ Key - DEPRESS. A **DIRECT TO** Page appears with the cursor over the current TO waypoint.

2. Line Select Key - DEPRESS to position the cursor over the desired **HP** identifier. (Figure 3-89)

*NOTE: Active Flight Plans exceeding 18 waypoints will be continued on subsequent pages. Press ⊕, **NXT** or **PRV** Key to access remaining waypoints.*

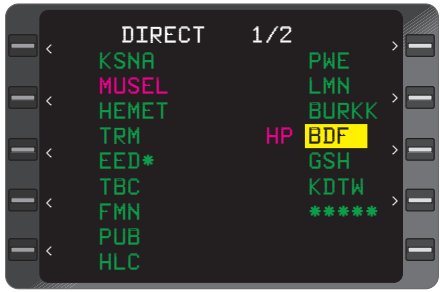


Figure 3-89

3. **ENT** Key - DEPRESS to display the **HOLDING PATTERN** Page with both the **OK? ENT** and **CANCEL** option. (Figure 3-90)

NOTE: The holding pattern may be edited if required , at this time. See Page 3-67 for details.

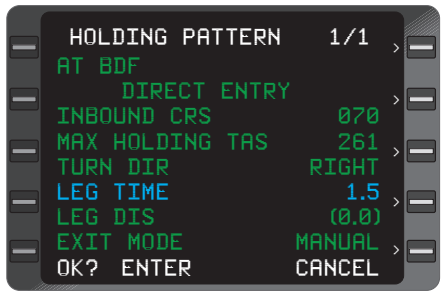


Figure 3-90

To Select and Go Direct To HP Waypoint:

4. **ENT** Key - DEPRESS. Display automatically advances to **NAVIGATION** Page 1.

5. **DIS, DTK** - CHECK.

To Cancel Holding Pattern:(from the Holding Pattern page)

1. Line Select - DEPRESS to position cursor over desired HP waypoint.

2. Hold Key - DEPRESS

3. Line Select Key - DEPRESS to position the cursor over **CANCEL?.**

4. **ENT** Key - DEPRESS. Display automatically advances to **NAVIGATION** Page 1 and aircraft proceeds Direct To the waypoint with the Holding Pattern canceled.

DIRECT TO - RANDOM WAYPOINT

This procedure enables the pilot to add a random waypoint to the **ACTIVE FLIGHT PLAN** in the desired sequence and proceed direct to it.

1. Key - DEPRESS. The cursor will automatically appear over the current **TO** waypoint on the **DIRECT TO** Page.

2. Line Select Key - DEPRESS to position the cursor over the identifier to follow the new entry. (Figure 3-91)

3. Type in the waypoint identifier.

4. **ENT** Key - DEPRESS.

5. Waypoint Page Coordinates - VERIFY or INSERT. To insert Waypoint Coordinates (cursor over **POS** field):

 a. Latitude - INSERT (**N** or **S** first, then degrees, minutes and hundredths (6 characters)).

 b. **ENT** Key - DEPRESS.

 c. Longitude - INSERT (**E** or **W** first, then degrees, minutes and hundredths (7 characters)).

6. **ENT** Key - DEPRESS.

7. Waypoint Sequence - VERIFY that the waypoint is in the proper location. (Figure 3-92)

8. **ENT** Key - DEPRESS. Display automatically advances to **NAVIGATION** Page 1.



Figure 3-91

NOTE: If Direct To a pilot entered waypoint is desired, a latitude and longitude entry may be required.



Figure 3-92

*A. Latitude - Insert **N** or **S** first, then degrees, minutes, and hundredths (6 characters)*

*B. Longitude - Insert **E** or **W** first, then degrees, minutes, and hundredths (7 characters)*

If Direct To an offset waypoint is desired, the radial and distance entry from the parent waypoint may be required.

*NOTE: If **ENT** Key is not depressed prior to leaving **DIRECT** Page, the waypoint identifier will not appear on the Active Flight Plan, the aircraft will not proceed DIRECT TO this waypoint and will need to be re-entered.*

9. **DIS, DTK** - CHECK.

*NOTE: A Direct To function may also be accomplished from **NAVIGATION** Page 1, 2, or 3 by placing the cursor over the **TO** waypoint and typing in the desired waypoint if required. Depress the **ENT** Key and the system will proceed Direct To the selected waypoint.*

If the selected waypoint was not on the active FPL a fence will be added to the FPL and no AUTO LEG BACK will occur beyond this waypoint.

*Anytime the Direct To function is used to go Direct To the MAP the Approach Procedure will be canceled. The **SYSTEM MESSAGE** page will display **APPROACH CANCELED** and the CDI sensitivity will return to Terminal scale of 1NM full scale deflection.*

DIRECT TO - CLOSEST AIRPORT

This procedure allows the pilot to select a desired airport and proceed DIRECT TO it.

1. D→ Key- DEPRESS until **DIR CLOSEST ARP** Page appears. (Figure 3-93)

 When initially accessed the cursor will be over the airport closest to the aircraft's present position at that time.



Figure 3-93

2. Line Select Key - DEPRESS to position the cursor over the desired airport identifier and press **ENT. NAVIGATION** Page 1 will be displayed and the airplane will proceed D→ to the selected airport.

NOTE: The bearing and distance values to the closest airports are based on the aircraft's present position at the time this page is accessed. The values are not updated while the page is being displayed. To obtain updated information, it is necessary to exit the page then return.

PSEUDO-VORTAC (SELECTED COURSE)

1. **NAV** Key - DEPRESS to display **NAVIGATION** Page 1.

*NOTE: The system must be proceeding Direct To a waypoint or **DTK** will not be an enterable field. If system is proceeding Direct To the desired waypoint, proceed to Step 5. If system is not currently proceeding direct to a waypoint, continue with Step 2.*

2. Line Select Key - DEPRESS to position cursor over **TO** field.
3. **TO** Waypoint Identifier - INSERT (if necessary).
4. **ENT** Key - DEPRESS.

If Waypoint Page Appears:

a. Waypoint Page Coordinates - VERIFY or INSERT.

b. **ENT** Key - DEPRESS.

5. Desired Track **(DTK)** - INSERT. (Figure 3-94)

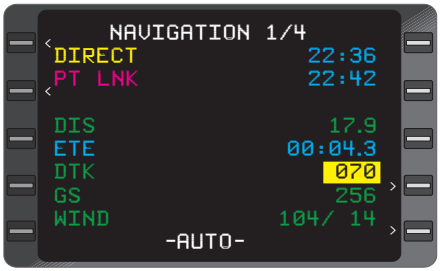


Figure 3-94

6. **ENT** Key - DEPRESS. If the **DTK** entry positions the aircraft on the FROM, or far, side of the TO waypoint, the Leg Change Mode switches to **-MAN-**, otherwise it remains in **-AUTO-.** (Figure 3-95) The pilot must determine if **-MAN-** or **-AUTO-** is appropriate.



Figure 3-95

NOTE: The system will turn the aircraft to intercept the DTK at up to a 45° angle if coupled to the autopilot.

*NOTE: The ⇢D function may also be used to initiate a Pseudo-VORTAC. Following the Direct To entry using the ⇢D Key the display automatically advances to **NAVIGATION** Page 1. Manually position the cursor over DTK field and continue as described above in Steps 5 and 6. To exit Pseudo-VORTAC Mode make any leg change (e.g. ⇢D Key press and enter current TO waypoint). When exiting Pseudo-VORTAC the system may return to the **-AUTO-** Leg Change Mode unless the system was in **-MAN-** prior to initiating Pseudo-VORTAC.*

*A manual leg change means the system will not automatically sequence to the next waypoint on the active flight plan. To sequence to the next waypoint in the flight plan, use the Direct To function or place the cursor over **-MAN-.** Press the **BACK** Key and **AUTO?** will be displayed. Press the **ENT** Key and the system will return to the automatic leg change mode.*

USING HEADING VECTOR

This procedure enables the pilot to program and fly a specific heading vector as well as program an automatic intercept of a specified leg.

PROGRAMMING A HEADING VECTOR

1. **HDG** Key - DEPRESS to display **HEADING VECTOR** Page with cursor over the **HDG** field.
2. Heading - INSERT desired Heading in whole degrees, preceded by **R** or **L,** if applicable, to indicate a turn direction. (Figure 3-96)



Figure 3-96

*NOTE: **R** or **L** should be used for a heading change greater than 180° from the present heading. A **T** in the **HDG** and **DTK** fields indicates the system is operating in the true heading mode.*

3. **ENT** Key - DEPRESS. The cursor advances to Heading Mode field. (Figure 3-97)
4. **ENT** Key - DEPRESS to select Heading Select Mode and return to **NAVIGATION** Page 1.

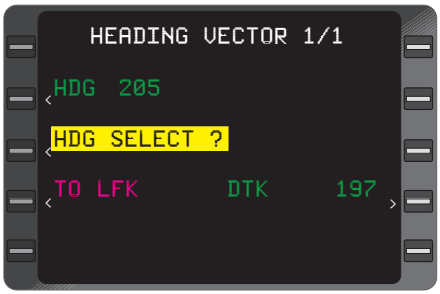


Figure 3-97

*NOTE: **HDG SELECT** and the programmed heading are displayed on **NAVIGATION** Page 1 indicating the aircraft is in Heading Select Mode. (Figure 3-98)*



Figure 3-98

CHANGING HEADING VECTOR WHILE IN HEADING SELECT MODE

1. **HDG** Key - DEPRESS to display **HEADING VECTOR** Page with cursor over the **HDG** field.
2. Heading - INSERT desired Heading.
3. **ENT** Key - DEPRESS.

*NOTE: Cursor moves to the Heading Mode field, but it is not necessary to depress **ENT** Key because the system is already in heading select mode..*

4. **NAV** or **ENT** Key - DEPRESS to check heading and return to **NAVIGATION** Page 1.

CHANGING TO WAYPOINT WHILE IN HEADING SELECT MODE

*NOTE: This procedure establishes a leg between the new **TO** Waypoint and the waypoint preceding it on the Active Flight Plan or a Pseudo-VORTAC. If crosstrack distance exceeds 125nm, the **HEADING** Mode will be canceled and the **STRG INVALID** message will be displayed.*

1. **HDG** Key - DEPRESS to display **HEADING VECTOR** Page.
2. Line Select Key - DEPRESS to position the cursor over **TO** Waypoint. (Figure 3-99)
3. **BACK** Key - DEPRESS to cycle through waypoints on the Active Flight Plan or INSERT alternate waypoint.



Figure 3-99

4. **ENT** Key - DEPRESS.

If Waypoint Page Appears:

a. Waypoint Page Coordinates - VERIFY or INSERT.

b. **ENT** Key - DEPRESS. Cursor moves to **DTK** field.

5. Desired Track **(DTK)** - VERIFY or INSERT.

6. **ENT** Key - DEPRESS. **OK? ENT** message appears. (Figure 3-100)
7. **ENT** Key - DEPRESS to select **TO** Waypoint and return to **NAVIGATION** Page 1. The cursor may be positioned over the Leg Change Mode field.

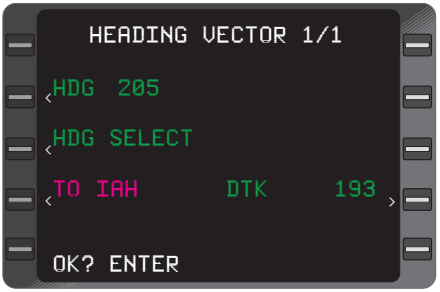


Figure 3-100

*NOTE: If the Desired Track is changed, a Pseudo-VORTAC is programmed. If the **DTK** entry positions the aircraft on the FROM, or far-side of the **TO** waypoint, the Leg Change Mode displayed on **NAVIGATION** Page 1 switches to **-MAN-,** otherwise it remains in **-AUTO-.** The pilot must determine if **-MAN-** or **-AUTO-** is appropriate.*

CANCELING HEADING SELECT MODE

Initiate a DIRECT TO procedure, using the ⇻ and **ENT** Keys, which immediately cancels the commanded heading or perform the following:

1. **HDG** Key - DEPRESS to display **HEADING VECTOR** Page.
2. Line Select Key - DEPRESS to position the cursor over **HDG SELECT.**
3. **BACK** Key - DEPRESS until **CANCEL?** is displayed.
4. **ENT** Key - DEPRESS to cancel Heading Vector and return to **NAVIGATION** Page 1.

NOTE: The system may turn the aircraft to intercept the current TO/FROM leg at up to a 45° angle.

PROGRAMMING AN INTERCEPT

1. **HDG** Key - DEPRESS to display **HEADING VECTOR** Page with cursor over the **HDG** field.
2. Heading - INSERT desired Heading in whole degrees, preceded by **R** or **L,** if applicable, to indicate a turn direction.

*NOTE: **R** or **L** should be used for a heading change greater than 180° from the present heading. A **T** indicates the system is operating in the true heading mode.*

3. **ENT** Key - DEPRESS. The cursor advances to Heading Mode field.
4. **BACK** Key - DEPRESS to select **INTERCEPT?** (Figure 3-101)
5. **ENT** Key - DEPRESS. Cursor moves to the **TO** Waypoint field.
6. **BACK** Key - DEPRESS, if required, to cycle through waypoints on the Active Flight Plan or INSERT an alternate waypoint. (Figure 3-102)
7. **ENT** Key - DEPRESS.

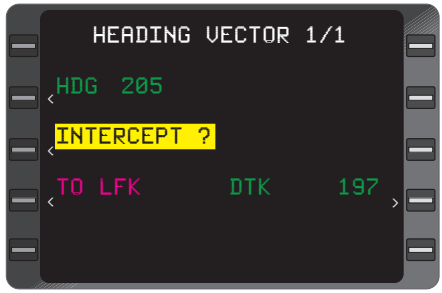


Figure 3-101



Figure 3-102

If Waypoint Page Appears:

a. Waypoint Page Coordinates - VERIFY or INSERT.

b. **ENT** Key - DEPRESS. Cursor moves to DTK field.

8. Desired Track **(DTK)** - VERIFY or INSERT.

*NOTE: If the Desired Track is changed, a Pseudo-VORTAC is programmed. If the **DTK** entry positions the aircraft on the FROM, or far, side of the **TO** waypoint, the Leg Change Mode on NAV page 1 switches to **-MAN-,** otherwise it remains in **-AUTO-.** The pilot must determine if **-MAN-** or **-AUTO-** is appropriate.*

*NOTE: If a DME Arc endpoint is selected as the **TO** waypoint, a default DTK will be displayed based on the point at which the ARC will be intercepted and DTK is not selectable.*

9. **ENT** Key - DEPRESS. An Intercept Message may appear **(NO COURSE INTERCEPT, NO ARC INTERCEPT,** or **INTERCEPT BEYOND FIX** (Figure 3-103). If no message appears the intercept will occur on the **TO** side of the selected **TO** waypoint.

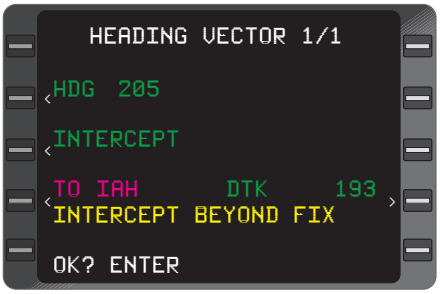


Figure 3-103

The intercept messages are based on the current aircraft heading and track. Once the selected heading has been established, the **HEADING VECTOR** Page may be viewed to determine the intercept status. If **NO COURSE INTERCEPT** or **NO ARC INTERCEPT** occurs, the message light will illuminate and these messages will be displayed on the **SYSTEM MESSAGES** Page. To view one of these messages on the HDG Page, use the Line Select Key to remove the cursor from the page.

*NOTE: **BUSY - STANDBY** may be displayed in yellow momentarily while the intercept is calculated.*

10. **ENT** Key - DEPRESS to accept data and return to NAV page 1. The cursor is positioned over the Leg Change Mode if the **DTK** has been entered manually on the Heading Page.

PROGRAMMING A HEADING INTERCEPT TO THE FINAL APPROACH COURSE

This procedure non-precision approach may be accomplished using the following steps:

1. **HDG** - DEPRESS to display the **HEADING VECTOR** Page.
2. Type in the assigned heading. (Figure 3-104)
3. **ENT** Key - DEPRESS. The cursor moves to the heading mode field.



Figure 3-104

4. **BACK** Key - DEPRESS to display the **INTERCEPT?** prompt. (Figure 3-105)
5. **ENT** Key - DEPRESS. The cursor moves to the **TO** field.
6. **BACK** Key - DEPRESS until the FAF waypoint is displayed.
7. **ENT** Key - DEPRESS.

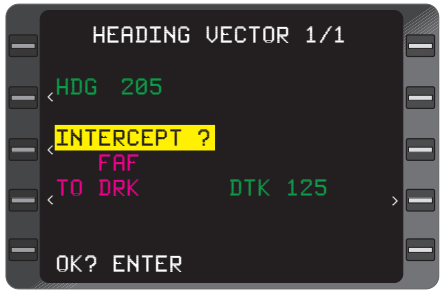


Figure 3-105

8. Enter the inbound final approach course in the **DTK** field if required.
9. **ENT** Key - DEPRESS Twice to return to Navigation Page 1.

 NAVIGATION Page 1 will be displayed with the **TO** waypoint, the FAF, and waypoint previous to the FAF in the **FR** field if no manual **DTK** was entered. The system will now intercept the Final Approach course and sequence to the MAP.

*NOTE: If an intercept is programmed to a FAF that is part of a Procedure Turn the **DTK** must be manually entered. This will cause PSEUDO VORTAC to be displayed on NAV Page 1.*

PROGRAMMING A HOLDING PATTERN

WARNING: When entering PTs or HP airspace the FMS may not constrain the airplane from violating maneuvering airspace. Pilots are responsible for procedural compliance.

This procedure enables the pilot to program a Holding Pattern (HP) at a specific waypoint.

An HP is automatically programmed from the database when it is part of an Arrival or Approach procedure.

NOTE: No HP can be programmed at an ARC end point on the final Approach course manually.

1. **NAV, FPL,** or ⊕ Key - DEPRESS to display applicable page.
2. Line Select Key - DEPRESS to position the cursor over desired waypoint.

*NOTE: On **NAVIGATION** Pages, only the **TO** Waypoint can be selected, and on the **Active Flight Plan** Page, a Holding Pattern cannot be programmed at the **FR** or **TO** Waypoint.*

NOTE: If WPT is a duplicate WPT the country code will be displayed in this field in parenthesis (in green) (Figure 3-106)

3. **HOLD** Key - DEPRESS to display **HOLDING PATTERN** Page with cursor over the **INBOUND CRS** field. (Figure 3-106)
4. **INBOUND CRS** - VERIFY or INSERT.

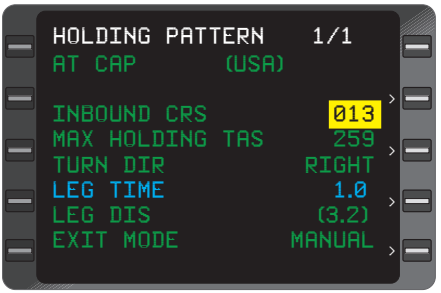


Figure 3-106

*NOTE: A verified Inbound Course programs a **DIRECT ENTRY** procedure. The system Defaults to the inbound course between the previous WPT on the FPL and the waypoint at which the hold is desired. If a Direct **TO** Leg is displayed on the NAV pages the inbound course defaults to the leg between the aircraft's present position and the current **TO** waypoint. When an inserted Inbound Course value is beyond the **DIRECT ENTRY** parameters, then a **TEARDROP** or **PARALLEL** pattern is programmed.*

When a Holding Procedure is initiated, the inbound course is displayed on **NAVIGATION** Page 1. If the CDI needle does not automatically slew to the inbound course, manually set the CDI needle to the inbound course so that the course needle sensing is correct.

*A **T** adjacent to the value displayed in the **INBOUND CRS** field indicates the course is referenced to true north.*

5. **ENT** Key - DEPRESS. The type of entry is displayed. Cursor moves to the **LEG TIME** field. (Figure 3-107)
6. **LEG TIME** - VERIFY or INSERT (valid range 1.0 to 9.9 min).
7. If Holding Pattern is complete proceed to Step 11. If Optional Entries are required, continue with Steps 8, 9, or 10.

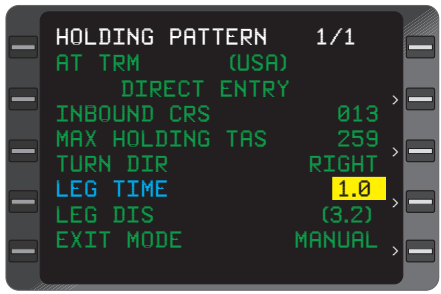


Figure 3-107

Optional Entry: Turn Direction

8. Line Select Key - DEPRESS to position the cursor over TURN DIR.
 a. **BACK** Key - DEPRESS to change direction.
 b. **ENT** Key - DEPRESS.

Optional Entry: Leg Distance

9. Line Select Key - DEPRESS to position the cursor over **LEG DIST.**
 a. Leg Distance - INSERT or VERIFY (valid range 1.0nm to 50nm).
 b. **ENT** Key - DE-PRESS.

NOTE: When the leg distance is entered, the leg time will be computed as indicated by parentheses and vice-versa. (Figure 3-108)

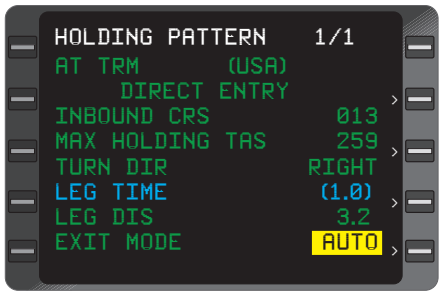


Figure 3-108

Selecting Exit Mode:

10. Line Select Key - DEPRESS to position the cursor over **MANUAL** or **AUTO.** Press the **BACK** key to change exit mode option. Selecting **MANUAL** will initiate a continuous hold. Selecting **AUTO** will exit the hold the next time the HP fix is crossed or after the entry procedure is completed. (Figure 3-109)

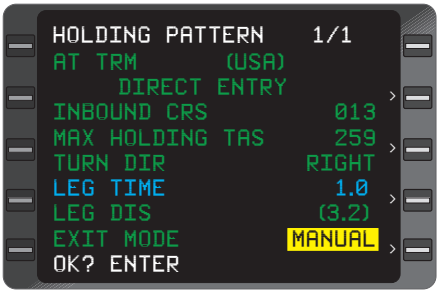


Figure 3-109

11. **ENT** Key - DEPRESS. **OK? ENT** prompt will appear. Verify inputs.

12. **ENT** Key - DEPRESS to load the Holding Pattern at the selected waypoint and return to the **NAVIGATION, DIRECT TO,** or **FPL** Page.

REVIEWING, EDITING, OR CANCELING A HOLDING PATTERN

This procedure enables the pilot to review, edit, or cancel a Holding Pattern at a specific waypoint.

REVIEWING

1. **NAV, FPL,** or ⊣B→ Key - DEPRESS to display applicable page.

2. Line Select Key - DEPRESS to position the cursor over desired **HP** waypoint.

*NOTE: On **NAVIGATION** Pages, only the **TO** Waypoint can be selected, and on the Active Flight Plan, the **TO** Waypoint can only be reviewed.*

3. **HOLD** Key - DEPRESS to display **HOLDING PATTERN** Page. (Figure 3-110)

4. Holding Pattern - REVIEW.

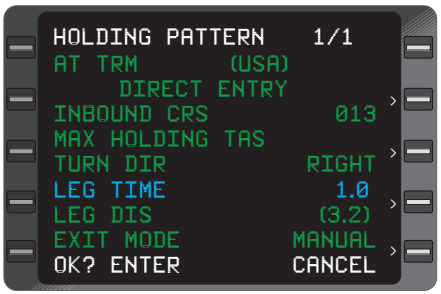


Figure 3-110

EDITING

5. Line Select Key - DEPRESS to position cursor over desired field.

 a. INSERT value for I**NBOUND CRS, LEG TIME,** or **LEG DIST** or

 b. **BACK** Key - DEPRESS to change **TURN DIR** or **EXIT MODE.**

6. **ENT** Key - DEPRESS. The **OK? ENT** prompt will appear.

*NOTE: A re-entry to the Holding Pattern must be flown if the Inbound Course or Turn Direction are changed while holding at the **HP** Waypoint. No XFILL capability is available to the other system in a dual system installation from one or both systems when a holding pattern is in progress.*

7. **ENT** Key - DEPRESS to return to the **NAVIGATION, DIRECT TO**, or **FPL** Page.

CANCELING

1. Line Select Key - DEPRESS to position the cursor over the **CANCEL?** prompt. (Figure 3-111)

2. **ENT** Key - DEPRESS. The **HP** annunciation is erased from **NAVIGATION, DIRECT TO**, and **FPL** Pages.

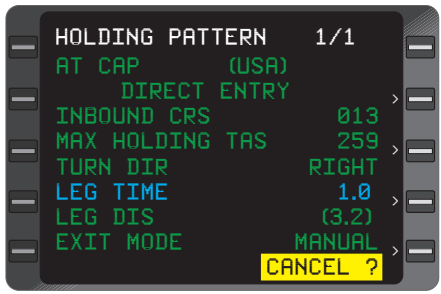


Figure 3-111

*NOTE: If canceling holding pattern at the current **TO** Waypoint, **HP** or **AT** is replaced by **"TO".***

EXITING A HOLDING PATTERN

This procedure gives the pilot three options to exit a Holding Pattern: exiting the next time over a holding fix, going Direct To the holding fix, or performing a Leg Change.

EXITING HOLDING PATTERN NEXT TIME OVER HOLDING FIX

1. **NAV** Key - DEPRESS to display **NAVIGATION** Page 1, 2 or 3.
2. Line Select Key - DEPRESS to position the cursor over **MANUAL.** (Figure 3-112)
3. **BACK** Key - DEPRESS to display **AUTO?.** (Figure 3-113)
4. **ENT** Key - DEPRESS. The **NAVIGATION** Page indicates that the aircraft will **EXIT HOLD** the next time over the holding fix (aircraft will complete the loop around the holding pattern). (Figure 3-114)

*NOTE: The next **(NX)** waypoint information may also appear if the exit is made during Waypoint Alert.*

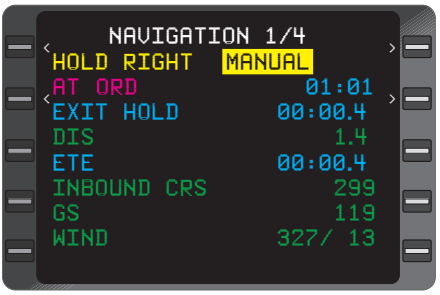


Figure 3-112

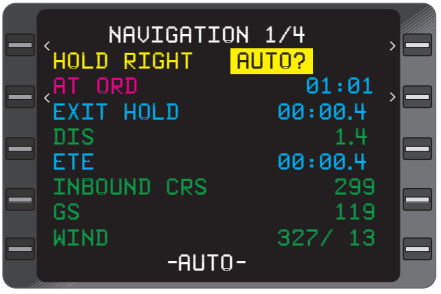


Figure 3-113

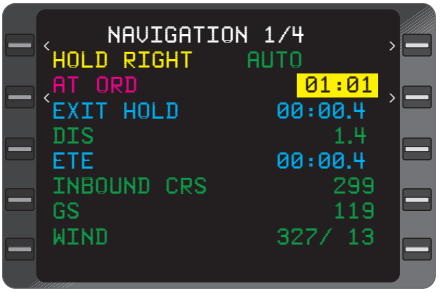


Figure 3-114

EXITING HOLDING PATTERN BY GOING DIRECT TO HOLDING FIX

1. D→ Key - DEPRESS to display Direct To Page with cursor over current **HP** Waypoint. (Figure 3-115)
2. **ENT** Key - DEPRESS to display **HOLDING PATTERN** Page with cursor over **CANCEL?.** (Figure 3-116)
3. **ENT** Key - DEPRESS to go Direct To current **TO** Waypoint (Holding Fix) and cancel Holding Pattern.



Figure 3-115

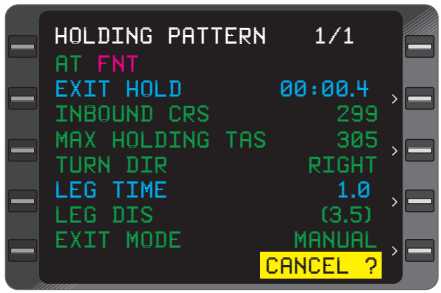


Figure 3-116

EXITING HOLDING PATTERN BY PERFORMING A LEG CHANGE

1. **NAV** Key - DEPRESS to display the **NAVIGATION** Page 1.
2. Line Select Key - DEPRESS to position the cursor over **FROM** field **(HOLD RIGHT/ LEFT)**. (Figure 3-117)
3. **FR** Waypoint - INSERT desired waypoint.

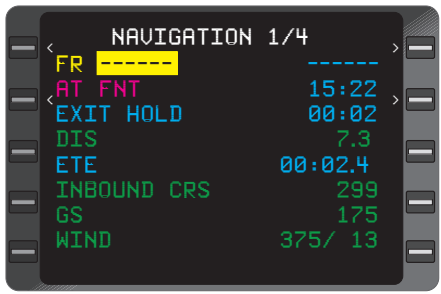


Figure 3-117

4. **ENT** Key - DEPRESS. The next waypoint in the Active Flight Plan sequence will appear in the **TO** field. (Figure 3-118)

5. **TO** Waypoint - VERIFY. To change the **TO** Waypoint, insert the desired identifier.

6. **ENT** Key - DEPRESS to activate the new leg and cancel the Holding Pattern.

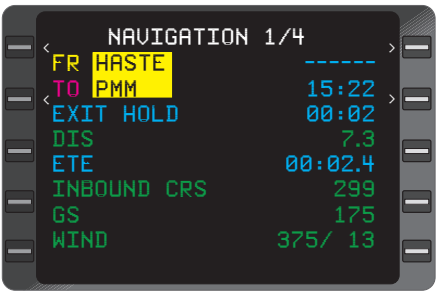


Figure 3-118

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VERTICAL NAVIGATION (VNAV) OPERATION - PRE-DEPARTURE

SETTING CRUISE ALTITUDE, TRANSITION LEVEL, AND DEFAULT FLIGHT PATH ANGLE

This procedure allows the pilot to define a Cruise Altitude and change the default values for Transition Level and Flight Path Angle.

After Initial Leg Selection:

1. **VNAV** Key - DEPRESS to display **VNAV** Page 1.
2. Line Select Key - DEPRESS to position cursor over **DATA?.** (Figure 3-119)
3. **ENT** Key - DEPRESS to display **VNAV DATA** Page with cursor over the **CRUISE ALT** field.
4. Cruise Altitude - INSERT. (Figure 3-120)

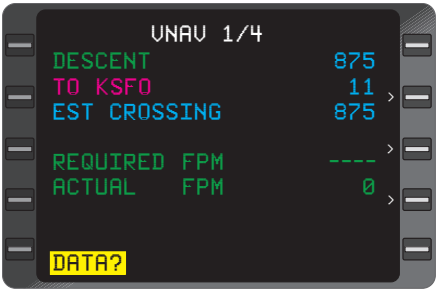


Figure 3-119

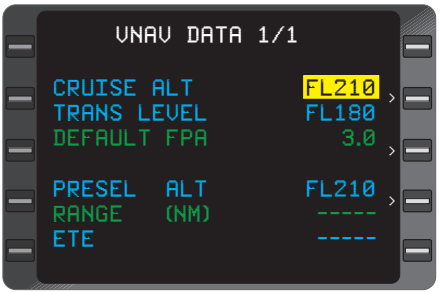


Figure 3-120

Only two or three digits are required to input an altitude, i.e. enter 80 and 8000 is displayed, enter 120 and 12000 is displayed.

Any altitude value entered greater than the **TRANS LEVEL,** altitude value which normally defaults to FL180, is converted and displayed as flight level **(FL).** Entering 210 will display FL210.

An altitude less than 1000 feet must be entered with a preceding zero, i.e., enter 052 and 52 is displayed.

*NOTE: **CRUISE ALT** may also be inserted on **VNAV** Page 1, line 3 (adjacent to the TO waypoint field) when #TOC or #TOD are the TO waypoint. The cruise ALT may automatically be entered by the preselector if the preselector has the capability and the system is configured for digital preselector.*

*A (at or above) or B (at or below) constraint entries are not applicable on this page. Setting a cruise altitude will establish a **#TOD** (Top of Descent) waypoint or a **#TOC** (Top of Climb) waypoint if VNAV is valid. A **#TOC** will be established only if there are no altitude constraints between the aircraft and **#TOC** and the aircraft is climbing.*

5. **ENT** Key - DEPRESS.

6. Transition Level - INSERT or VERIFY. (Figure 3-121)

*NOTE: Field defaults to FL180 if pilot does not enter a value. Anytime a **TRANS ALT** is entered, the value will remain in non-volatile memory even after the system is shut down.*

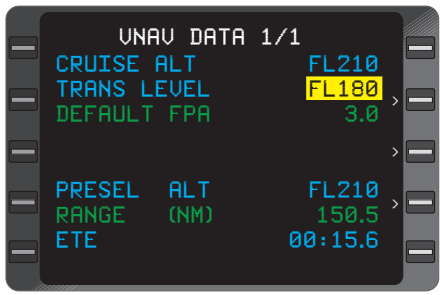


Figure 3-121

7. **ENT** Key - DEPRESS.

8. Default Flight Path Angle **(DEFAULT FPA)** - INSERT or VERIFY (in degrees and tenths, 0.1 to 6.0 range).

*NOTE: Field defaults to **3.0** if pilot does not enter a value. Anytime an **FPA** is entered, the value will remain in non-volatile memory even after the system is shut down.*

If configured, altitude preselector information will be displayed at the bottom of the screen. If the aircraft is in a climb or descent, distance and ETA information to the preselected altitude will be displayed. (Figure 3-119)

9. **ENT** Key - DEPRESS to return to **VNAV** Page 1.

CREATING/CHANGING VNAV WAYPOINTS

Vertical navigation constraints can only be programmed for waypoints on the Active Flight Plan, and though all Active Flight Plan waypoints are displayed on **VNAV** Pages, new waypoints must be added to the Active Flight Plan before they appear on the VNAV Flight Plan waypoint pages.

After initial leg selection on NAV page 1:

1. **NAV, FPL,** or ⇢ Key - DEPRESS to display applicable page.
2. Line Select Key - DEPRESS to position cursor over desired waypoint.

*NOTE: On **NAVIGATION** Pages, only the **TO** Waypoint can be selected. If the waypoint is selected from either the NAV, or Direct pages, Direct FPA information pages will be displayed on the last line of the screen. (Figure 3-123)*

3. **VNAV** Key - DEPRESS to display **VNAV WAYPOINT** Page for selected waypoint. (Figure 3-122)
4. **ALT** - INSERT altitude constraint followed by **A** (at or above) or **B** (at or below), if applicable. Only two or three digits are required to input an altitude, i.e. enter 30A and 3000A is displayed. Full digit entry may be used to enter an altitude. Altitudes less 1000 feet enter a preceding zero, i.e. enter 054 and 54 feet is displayed.

 Any altitude entered greater than the transition level is converted and displayed as flight level **(FL).**

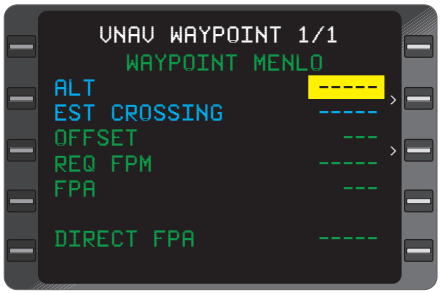


Figure 3-122

NOTE: If the waypoint is part of a SID, STAR or Approach procedure, appropriate altitude constraints will prefill from the database.

5. **ENT** Key - DEPRESS. Cursor moves to **OFFSET** field. (Figure 3-123)
6. **OFFSET** - If applicable, INSERT value in nautical miles (-99 to +99 range).
 a. If the offset is prior to the waypoint, enter the range value and a **(-)** prefills as a default or

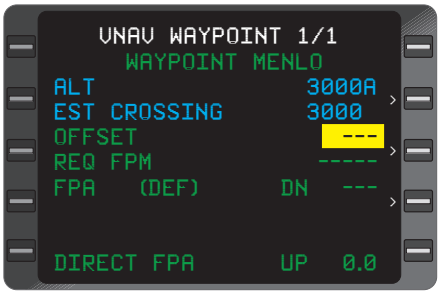


Figure 3-123

b. Enter a (+), then the range value to indicate the off set is beyond the waypoint.

c. To erase the offset value, INSERT **0** and press **ENT** Key. The field changes to dashes, indicating no offset is programmed.

7. **ENT** Key - DEPRESS. The cursor moves to the FPA field only if the entered constraint is below the aircraft's present altitude.

NOTE: A climb FPA cannot be programmed but the direct FPA field will display the up angle between the aircraft's present altitude and the altitude constraint that was entered. If an FPA is programmed to a direct FPA up waypoint it will be a DN (descent) FPA and an ambiguity will be displayed on the VNAV waypoint page.

To program a Path Descent

8. Flight Path Angle (**FPA**) - INSERT or VERIFY (valid range is 0.1 to 6.0). (Figure 3-124)

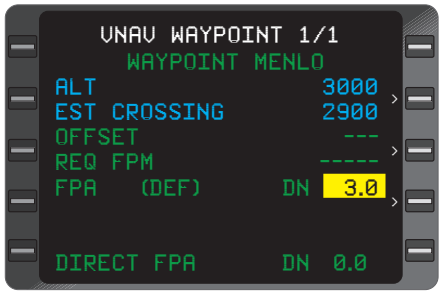


Figure 3-124

*NOTE: The **FPA** value field prefills with the default **(DEF)** value programmed on the **VNAV DATA** Page if this waypoint was accessed from the FPL Page. If accessed from the **NAV** or ⇢ Page, the **FPA** field prefills with the **(DIR)** value. If an **FPA** is manually entered, the **FPA** type field changes to **(MAN).***

With the cursor over the **FPA** value, Depressing the **BACK** Key will cycle through all or some of the following:

- **(DEF)**
- **(DB)**
- **(AUTO)**
- **(DIR)**
- **(MAN)**

To cancel the **FPA,** INSERT **0** and press **ENT** Key. The field changes to dashes, indicating no **FPA** is programmed, the vertical deviation output is invalid and no vertical deviation information will be displayed on the CDU or the ADI/HSI.

9. **ENT** Key - DEPRESS to load or verify the **FPA** value.

*NOTE: When a descent **FPA** is programmed at a waypoint, a **G** appears next to the altitude constraint indicating a Glide Path and vertical deviation guidance and information will be available.*

REVIEWING VNAV WAYPOINTS

When SIDs, STARs or Approaches have altitude constraints at waypoints on the procedure, the system automatically loads the altitude constraints from the database on to the Active Flight Plan. No altitude will be loaded at the MAP if the approach is a circling approach, or the MAP is abeam or beyond the runway threshold. The system will not load any "expect to cross" altitudes from the database on to the SIDS or STARS, as part of **ACTIVE FLIGHT PLAN** or **VNAV** Pages. No altitudes are loaded from the database when an approach procedure contains a Procedure Turn.

NOTE: The system will not fly a full SID or STAR procedure.

Using Active Flight Plan Page

1. **FPL** Key - DEPRESS to display the **ACTIVE FLIGHT PLAN** Page.
2. Line Select Key - DEPRESS to position the cursor over the desired waypoint.
3. **VNAV** Key - DEPRESS. The **VNAV WAYPOINT** Page appears with the cursor over the **ALT** field. (Figure 3-125)
4. **ALT** - REVIEW.

*NOTE: If **(AUTO) FPA** is displayed, the system has automatically programmed a waypoint-to-waypoint **FPA** for the procedure.*

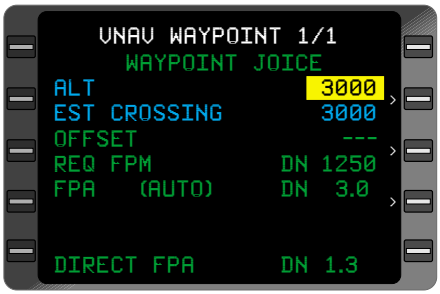


Figure 3-125

5. **ENT** Key - DEPRESS until display returns to A**CTIVE FLIGHT PLAN** Page or depress the **FPL** Key.

6. Repeat Steps 2 through 5 to review VNAV waypoint data at remaining waypoints.

Using VNAV Flight Plan Waypoints Page

1. **VNAV** Key - DEPRESS to display the **VNAV FLIGHT PLAN WAYPOINTS** Pages.
2. Line Select Key - DEPRESS to position the cursor over the desired waypoint.
3. **ENT** Key - DEPRESS. The **VNAV WAYPOINT** Page appears with the cursor over the **ALT** field. (Figure 3-126)
4. **ALT** - REVIEW or INSERT new value.

*NOTE: If the **FPA** was retrieved from the database, **(DB)** appears in the **FPA** type field. (Figure 3-126)*

5. **ENT** Key - DEPRESS to return to the **VNAV FLIGHT PLAN WAYPOINTS** Page.
6. Repeat Steps 2 through 5 to review or change altitude constraints at remaining waypoints.

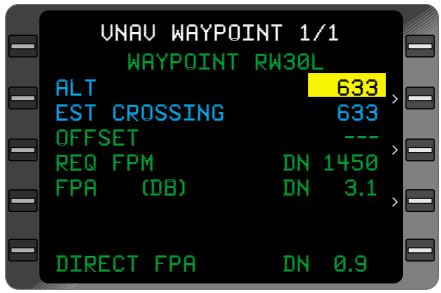


Figure 3-126

VERTICAL NAVIGATION - ENROUTE

PROGRAMMING VERTICAL PATH DESCENTS

The pilot can use various methods to load a Flight Path Angle (FPA) and determine the aircraft's descent path.

NOTE: When the system detects a rapid change of baro altitude setting, non-continuous data from an air data computer, vertical speed change of more than 40ft/sec, or sequencing to the next waypoint on the active flight plan, the vertical deviation output is momentarily set Invalid. When vertical deviation returns to a valid state, the appropriate value of vertical deviation will again be displayed.

Using Database (DB) FPA

The GNS-XL database contains Flight Path Angles associated with waypoints on SIDs, STARs, and Approaches, that prefill when these procedures are programmed into the Active Flight Plan. The **FPA** field on the **VNAV WAYPOINT** Page displays **(DB),** which indicates an FPA from the database is loaded and Vertical Deviation is provided at the programmed angle when the waypoint becomes the Vertical **TO** Waypoint. If the **FPA** at the **(DB)** VNAV waypoint is changed in any way, the **(DB) FPA** will no longer be available.

Using Default (DEF) FPA

The default **FPA** value will automatically be displayed if an altitude is programmed on the **VNAV WAYPOINT** Page, except if the **FPA** comes from the database or the **VNAV WAYPOINT** Page was accessed using a Direct To function.

The pilot can load the Default FPA (set on the **VNAV DATA** Page) by pressing the **ENT** Key when the cursor is on the **FPA** field of the **VNAV WAYPOINT** Page. The **FPA** field displays **(DEF)** and Vertical Deviation is provided at the programmed angle when the waypoint becomes the Vertical **TO** Waypoint. (Figure 3-127)

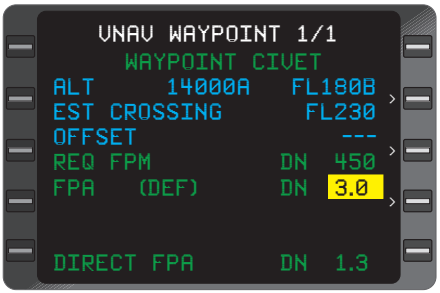


Figure 3-127

Using Manual (MAN) FPA

The pilot can type in a desired Flight Path Angle on the **VNAV WAYPOINT** Page within the valid range, 0.1 to 6.0 degrees. When the **ENT** Key is depressed the **FPA** is loaded, the **FPA** field indicates **(MAN)** and Vertical Deviation is provided at the programmed angle when the waypoint becomes the Vertical **TO** Waypoint.

Using Automatic (AUTO) FPA

The **(AUTO)** mode is provided to link together descent waypoints that have Cross-At type constraints and provide a computed Flight Path Angle between them. (Figure 3-128)

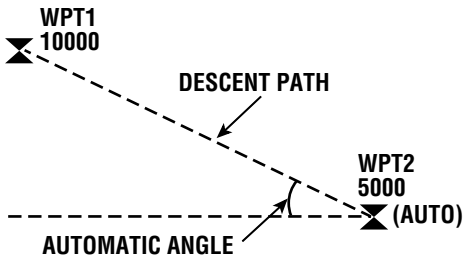


Figure 3-128

The **(AUTO)** mode may be selected ONLY if the chosen waypoint has a Cross-AT type constraint programmed. All Cross-AT waypoints that are a part of a STAR or APPROACH are automatically put into **(AUTO)** mode when the procedure is retrieved from the database and loaded onto the Active Flight Plan.

If the waypoint prior to the selected **(AUTO) FPA** waypoint has a Cross-AT-or-ABOVE, Cross-AT-or-BELOW, or Cross-BETWEEN constraint programmed, an automatic angle is assigned and will be the same angle as the programmed Default Angle on **VNAV DATA** Page. Vertical Deviation is provided at the programmed angle when the waypoint becomes the Descent Reference Waypoint.

*NOTE: If no **ALT** constraints are programmed before the selected **(AUTO) FPA** waypoint, the **(AUTO) FPA** is the same as the **(DEF) FPA.***

*Unless an **FPA** is programmed at a waypoint, the system uses the **(DEF) FPA** to the first waypoint on the flight plan with an altitude constraint to establish a **#TOD** point. To help establish **#TOD,** the system will automatically load the destination airport elevation on the flight plan, provided the flight plan was not obtained from AFIS. An altitude constraint and **FPA** must be loaded using the ENT Key to establish a Path Descent and activate Vertical Deviation to any waypoint except a (DB) WPT.*

EDITING ALTITUDE CONSTRAINTS

The following pages allow the pilot to edit altitude constraints for waypoints on the **VNAV WAYPOINT** Page, **VNAV** pages, referred to as **VNAV FPL** Pages. One of the three following options may be used:

OPTION 1: Using the **VNAV** Page.

OPTION 2. Using the **VNAV FPL WAYPOINT** Pages.

OPTION 3: Using the **VNAV WAYPOINT** Page.

Option 1: Using VNAV Page

1. **VNAV** Key - DEPRESS to display **VNAV 1/2** Page. The altitude constraint may be changed on this page if the current TO waypoint has a constraint programmed. Type the new altitude in the altitude field adjacent to the TO WPT. All parameters associated with the former constraint will remain unchanged, i.e., FPA, A, B, G, or OFFSET. (Figure 3-129)

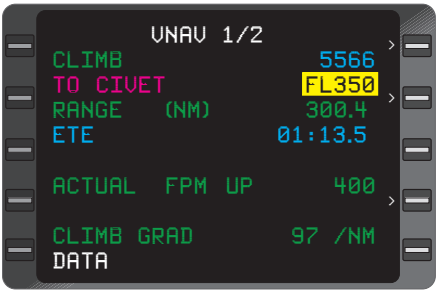


Figure 3-129

2. **ENT** Key - DEPRESS.

Option 2: Using VNAV FPL WAYPOINT Page

1. **VNAV** Key - DEPRESS to display the **VNAV 2/2** Page.

*NOTE: More **VNAV** Pages will be available if the active flight plan has several pages of waypoints.*

2. Line Select Key - DEPRESS to position the cursor over the desired waypoint altitude. (Figure 3-130)

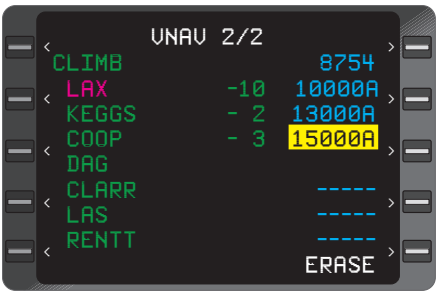


Figure 3-130

3. Altitude Constraint - INSERT new altitude constraint followed by **A** (at or above) or **B** (at or below), if applicable. Any altitude value entered greater than the Transition Level value on the data page is converted and displayed as **FL** (flight level, rounded off to the nearest hundred feet). An altitude less than 1000 feet must be entered with a preceding zero.

4. **ENT** Key - DEPRESS.

Option 3: Using the VNAV WAYPOINT Page

1. **NAV, FPL,** or ⊕→ Key - DEPRESS to display applicable page.

2. Line Select Key - DEPRESS to position cursor over desired waypoint.

*NOTE: On **NAVIGATION** Pages, only the **TO** Waypoint can be selected.*

3. **VNAV** Key - DEPRESS to display **VNAV WAYPOINT** Page for selected waypoint. (Figure 3-131)

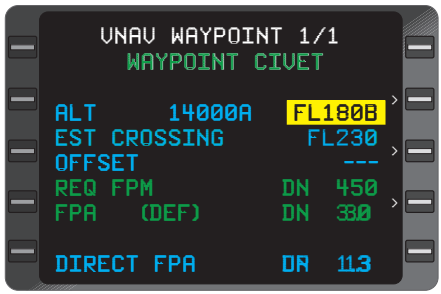


Figure 3-131

4. **ALT** - INSERT new altitude constraint followed by **A** (at or above) or **B** (at or below), if applicable. Only two or three digits are required to input an altitude, i.e. enter 30A and 3000A is displayed.

 Any altitude value entered greater than the Transition Level value on the data page is converted and displayed as flight level **(FL).** An altitude less than 1000 feet must be entered with a preceding zero.

NOTE: If the waypoint is part of a SID, STAR or Approach procedure, the altitude constraint prefills from database. "Cross-Between two Altitudes" type constraints, as shown in Figure 3-130, cannot be programmed manually.

5. **ENT** Key - DEPRESS. Cursor moves to **OFFSET** field.

6. **ENT** Key - DEPRESS. The cursor moves to the **FPA** field.

7. **ENT** Key - DEPRESS to return to the page where the VNAV waypoint was accessed.

DIRECT TO - VNAV WAYPOINT AS LATERAL WAYPOINT

This procedure enables the pilot to proceed Direct To a waypoint, both vertically and laterally by means of a Vertical Path Descent.

If the current To waypoint is the desired VNAV Direct To waypoint, go to Step 4.

1. Line Select Key (on **NAVIGATION** Page 1) - DEPRESS to position the cursor over the **TO** waypoint field. Type in the desired waypoint and press **ENT** or,

 D→ Key - DEPRESS. A **DIRECT TO** Page appears with the cursor over the current **TO** waypoint.

2. Line Select Key - DEPRESS to position cursor over desired waypoint. (Figure 3-132)

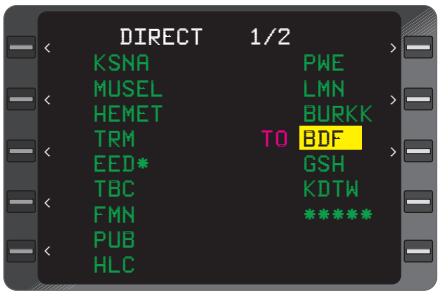


Figure 3-132

NOTE: Active Flight Plans containing more than 18 waypoints will display the remaining waypoints on subsequent pages. Press **D→** *key again, or* ***NXT*** *Key, to access remaining pages.*

A Random Waypoint may also be used. See DIRECT TO - Random Waypoint.

3. **ENT** Key - DEPRESS. CDU screen automatically advances to **NAVIGATION** Page 1.

NOTE: If an offset waypoint was selected, the system first displays the ***OFFSET WPT*** *Page. Verify data and DEPRESS* ***ENT.*** *The* ***DIRECT*** *Page will again be displayed with the cursor over the Offset Waypoint. Press* ***ENT.*** *The display automatically advances to* ***NAVIGATION*** *Page 1.*

4. Line Select Key - DEPRESS to position cursor over **TO** Waypoint on **NAVIGATION** Page 1. (Figure 3-133)

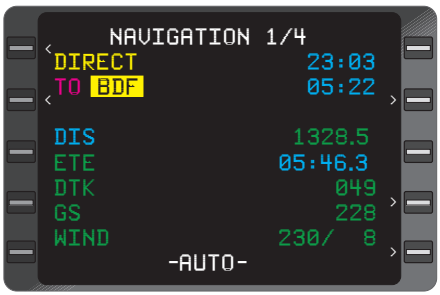


Figure 3-133

5. **VNAV** Key - DEPRESS to display the **VNAV WAYPOINT** Page for **TO** Waypoint.

6. **ALT** - INSERT or VERIFY. If an altitude constraint has already been programmed, the cursor will be displayed over the **FPA (DIR)** field value. You may proceed to Step 10. (Figure 3-135)

*NOTE: If the waypoint is part of a SID, STAR or Approach procedure, the **ALT** constraint field prefills from the database.*

7. **ENT** Key - DEPRESS. Cursor moves to **OFFSET** field. (Figure 3-134)

8. **OFFSET** - If applicable, INSERT value in nautical miles (-99 to +99 range)

 a. If the offset is prior to the waypoint, enter the range value and a **(-)** prefills as a default or

 b. enter a **(+)**, then the range value to indicate the offset is beyond the waypoint.

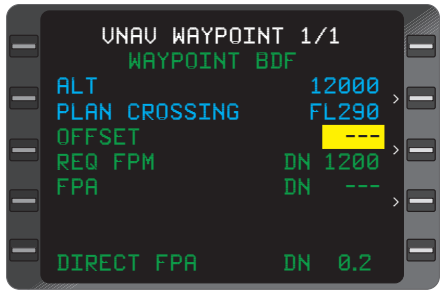


Figure 3-134

*NOTE: To erase the offset value, INSERT **0** and press **ENT** Key. The field changes to dashes, indicating no offset is programmed.*

9. **ENT** Key - DEPRESS. Cursor moves to the **FPA** field.

*NOTE: Cursor only moves to the **FPA** field if altitude constraint is below current baro altitude.*

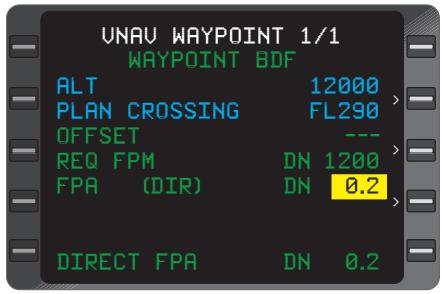


Figure 3-135

10. Flight Path Angle - VERIFY Direct Flight Path Angle is desirable to fly.

NOTE: Direct Flight Path Angle prefills if it is within the valid range (0.1 to 6.0). (Figure 3-135)

11. **ENT** Key - DEPRESS to accept waypoint entries. **VNAV** Page 1 is displayed, a Vertical Path Descent has been established, and Vertical Deviation information and guidance is enabled if a descent has been programmed.

DIRECT TO - VNAV WAYPOINT

This procedure allows the pilot to program a Direct To on the Vertical Flight Plan, while still flying the lateral waypoints on the Active Flight Plan. The VNAV Direct To function automatically deletes any intermediate altitude constraints and sets up a Path Descent to the Vertical TO Waypoint using the Direct Flight Path Angle.

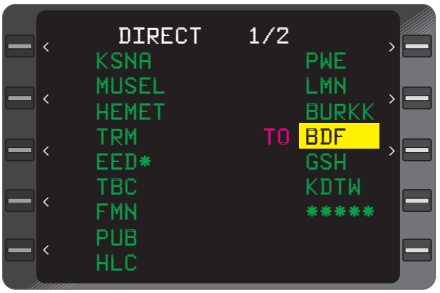


Figure 3-136

1. **D→** Key - DEPRESS. A **DIRECT TO** Page will appear with the cursor over the current **TO** waypoint.
2. Line Select Key - DEPRESS to position cursor over desired waypoint. (Figure 3-136)
3. **VNAV** Key - DEPRESS. **VNAV WAYPOINT** Page appears. If necessary, position cursor over **ALT** field (Figure 3-137). If an altitude constraint has already been programmed, the cursor will appear over the **FPA** value field (Figure 3-138). Go to Step 8.
4. **ALT** - INSERT or VERIFY.

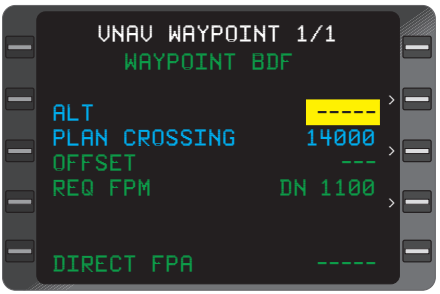


Figure 3-137

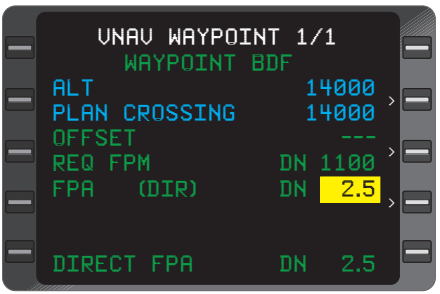


Figure 3-138

5. **ENT** Key - DEPRESS. Cursor moves to **OFFSET** field.

6. OFFSET - If applicable, INSERT value in nautical miles (-99 to +99 range).

 a. If the offset is prior to the waypoint, enter the range value and a (-) prefills as a default or

 b. enter a (+), then the range value to indicate the offset is beyond the waypoint

7. **ENT** Key - DEPRESS. Cursor moves to **FPA** field.

8. Flight Path Angle - VERIFY or INSERT (in degrees and tenths, 0.1 to 6.0 range).

NOTE: Direct Flight Path Angle prefills if it is within the valid range and an ALT is programmed. (Figure 3-138)

9. **ENT** Key - DEPRESS to accept waypoint entries and return to **VNAV** Page 1.

CREATING VNAV PROFILE WAYPOINTS

VNAV profile waypoints **(#TOC, #TOD,** and **#PRESL**) are used to provide a prediction of the position of the aircraft on the vertical flight path. These are non-enterable waypoints computed by the system based on current ground speed and vertical speed.

Top of Climb (#TOC)

Top of Climb Altitude is obtained from either the **CRUISE ALT** entered by the pilot on the **VNAV DATA** Page, or from the Altitude Preselector setting, if available. When the aircraft arrives at the pre-selected altitude, the system will automatically set cruise altitude to the pre-selected altitude which will then provide a **#TOD** prediction.

If vertical climb constraints are programmed, **#TOC** will automatically appear as the Vertical To Waypoint when the aircraft laterally passes within 1 mile the last vertical waypoint on the active flight plan that has a climb constraint. Once the aircraft has crossed the final climb constraint waypoint, **#TOC** will then become the Vertical To Waypoint. If there are no vertical constraints programmed for climb, **#TOC** will be displayed as the first vertical waypoint as long as the aircraft is in a climb.

When the programmed cruise altitude is reached, **#TOC** is removed from the VNAV Flight Plan, and **#TOD** becomes the Vertical To Waypoint.

When #TOC is the TO Waypoint:

The pilot may obtain range and **ETE** to any altitude above the aircraft during a climb.

1. **VNAV** Key - DEPRESS to display **VNAV** Page 1.
2. Line Select Key - DEPRESS to position the cursor over the **#TOC** altitude field. (Figure 3-139)
3. Alternate Altitude - INSERT. This value may be above or below the altitude pre-select value, but must be above the current baro altitude.
4. **ENT** Key - DEPRESS and observe the change in **RANGE** and **ETE.** (Figure 3-140)
5. Repeat steps 2 thru 4 to return to previous **#TOC** altitude setting.

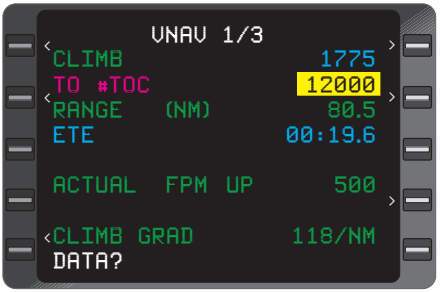


Figure 3-139

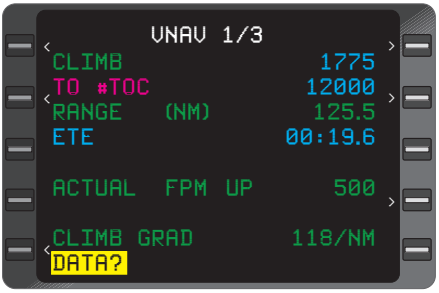


Figure 3-140

Top of Descent (#TOD)

The Top of Descent waypoint is the position where the aircraft intercepts the descent path at the cruise altitude. The system calculates the **#TOD** by establishing a valid Descent Reference Waypoint, then uses either the **CRUISE ALT** entered by the pilot on the **VNAV DATA** Page, or the Altitude Preselector setting, if available. The default FPA maybe used in this calculation.

If no Descent Reference Waypoint with FPA and crossing altitude is programmed, the system will use the arrival airport and elevation (ARP Reference Point, not a runway) and the default FPA to fix Top of Descent as long as the active flight plan is not an AFIS flight plan.

*NOTE: The default FPA may be used to establish **#TOD,** but no Vertical Deviation Valid will occur until the FPA is actually loaded from the **VNAV WPT** Page.*

One minute prior to arriving at **#TOD,** the system issues the **VNAV WPT ALERT** message and the discrete waypoint light will flash for 10 seconds, then go steady.

*NOTE: Changing **CRUISE ALT** on the CDU to a lower altitude should only be done after the aircraft has departed cruise altitude, or **#TOD** at the current cruise altitude will be lost.*

Pre-Selected Altitude Intercept Point (#PRESL)

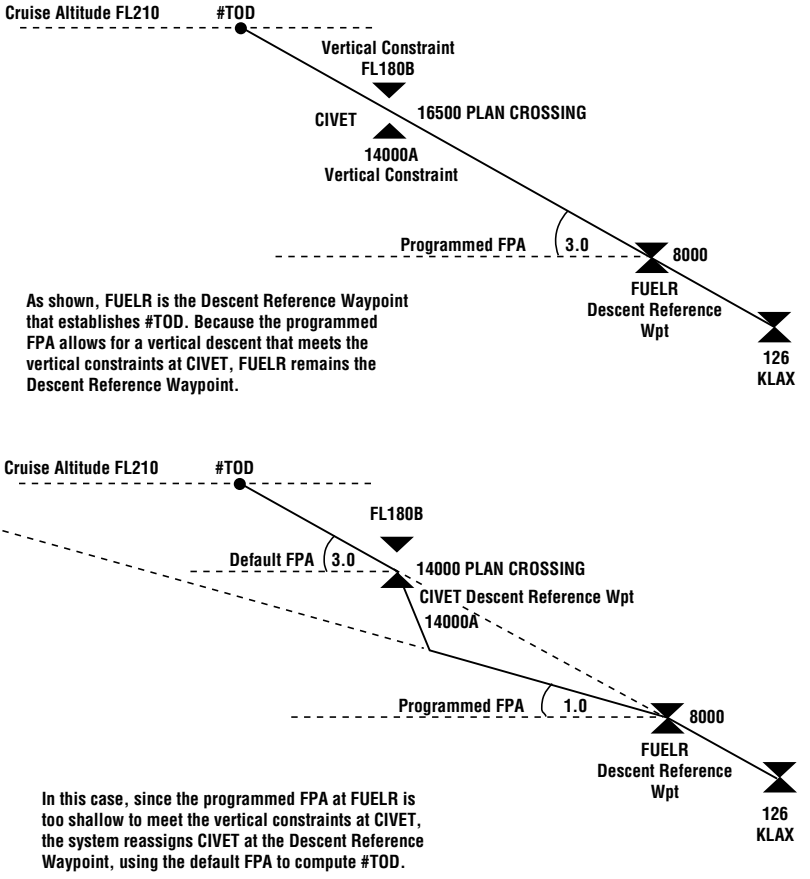
When the system has an input from an Altitude Pre-selector and the aircraft is flying toward this altitude, a profile waypoint **(#PRESL)** appears on the **VNAV** Page. **#PRESL,** however, never becomes the Vertical To Waypoint. When the Pre-selector input is valid, **ETE** and **RANGE** to **#PRESL** can be found on the **VNAV DATA** Page.

*NOTE: With certain types of Pre-Selectors installed (analog), it may be necessary to manually enter a **CRUISE ALT** when the **PRESEL ALT** is set higher than the cruise altitude. The system does not read analog Pre-selector output until the aircraft's baro is within approximately 1000ft of the pre-selected value.*

Descent Reference Waypoints

Descent Reference Waypoints have a fixed altitude crossing, i.e. Cross-At type altitude constraint. To create a Descent Reference Waypoint, the pilot can program a Flight Path Angle or a Cross-At altitude constraint.

If a programmed **FPA** violates a prior vertical constraint, the system reassigns the Descent Reference Waypoint, using the Default **FPA** from the **VNAV DATA** Page, as illustrated in Figure 3-141.



Top of Descent and Descent Reference Waypoint
Figure 3-141

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REMOTE TUNING

TUNING COMMS

This procedure enables the pilot to keyboard tune the aircraft radios via the CDU. Some control heads may require placement in the Remote Mode in order to accept tuning data from the CDU keyboard.

NOTE: If system is configured for 3 Comms the tune section will consist of 4 pages.

1. **TUNE** Key - DEPRESS. The Comm Radio **TUNE** Page will be displayed.
2. Line Select Key - DEPRESS (if necessary) to position cursor over appropriate **PRESET** field.
3. Frequency - INSERT. (Figure 3-142)

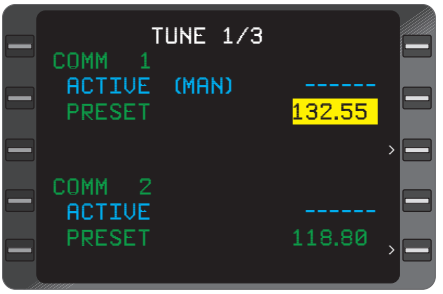


Figure 3-142

NOTE: Trailing zeroes are not required.

4. **ENT** Key - DEPRESS. **TRANSFER?** will automatically appear. (Figure 3-143)
5. **ENT** Key - DEPRESS. The entered **PRESET** frequency transfers to **ACTIVE.** The new frequency also displays as the **ACTIVE** frequency on the appropriate Comm control head.

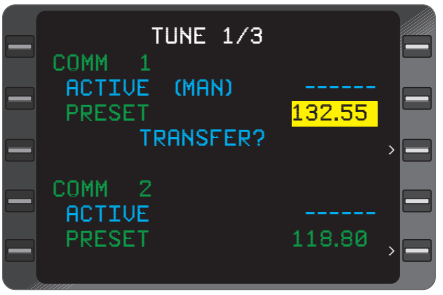


Figure 3-143

NOTE: Keyboard tuned frequencies may display for a few seconds then go to dashes if the frequency read back from the radio or the control head is not available.

*NOTE: **(MAN)** adjacent to Active Comm frequency indicates that the frequency has been entered using the COMM control head. No prompts are displayed when Active Comm frequency has been keyboard entered.*

*The **PRESET** frequency displayed on the control head is not necessarily the **PRESET** frequency displayed on the CDU. Each may be entered independently.*

*Depending on the system configuration the cursor can appear over the **PRESET** field for either **COMM 1** or **COMM 2.***

TUNING NAVs

Keyboard Method

If Station Identifier Is Used:

1. **TUNE** Key -DEPRESS until **NAV TUNE** Page is displayed. (Figure 3-144)
2. Line Select Key - DEPRESS to position cursor opposite the desired radio: **NAV 1** or **NAV 2.**
3. Station Identifier - INSERT or VERIFY entry. (Figure 3-145)
4. **ENT** Key - DEPRESS. The new frequency is displayed immediately and is annunciated with **(KEY)** adjacent to the frequency field. If the identifier is not found immediately, the **IDENT** field will go to dashes until the station is located in the database. Once located, the identifier will be displayed and the **(KEY)** annunciation will shift to the identifier line. (Figure 3-146)

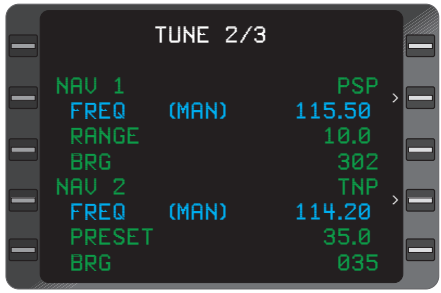


Figure 3-144

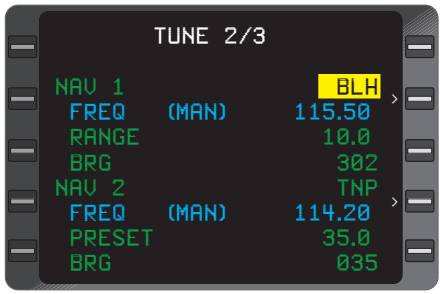


Figure 3-145

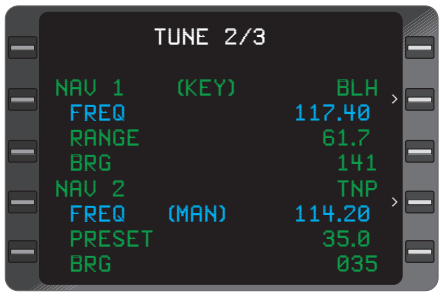


Figure 3-146

*NOTE: NAV tuning is designed to enhance the VPU (VORTAC Position Unit). The VPU will only use VOR/DME or DME only navaids (includes TACAN and ILS) therefore, only VOR/DME or DME only navaids will be displayed. In areas where a VOR only and a DME only are on the same frequency and within line of sight of the aircraft, entering the VOR identifier will result in the database replacing the VOR identifier with the "usable" DME identifier. When this occurs, the **RANGE** and **BRG** displays remain associated with the VOR even though it is no longer displayed. This ambiguity will occur when the frequency rather than the identifier is entered.*

When the CDU keyboard is used to tune a navaid, the local VPU database is searched for the tuned frequency. If found it is paired with the nearest usable Navaid identifier associated with that frequency. If the station identifier tuning method is used to tune the radio. the identifier ultimately paired with the tuned frequency may differ from the identifier originally entered. If the navaid is unusable, that is, out of range, or a frequency conflict exists, dashes will be displayed in the IDENT field and the new frequency will be displayed.

5. Frequency - VERIFY that the **ACTIVE** frequency on the control head and CDU displays agree.

If Station Frequency is Used:

1. **TUNE** Key -DEPRESS until NAV **TUNE** Page is displayed.
2. Line Select Key - DEPRESS to position cursor over desired **FREQ** field.
3. Frequency - INSERT or VERIFY. (Figure 3-147)

NOTE: Trailing zeroes are not required.

4. **ENT** Key - DEPRESS.
5. Frequency - VERIFY that control head display is tuned to the desired frequency.

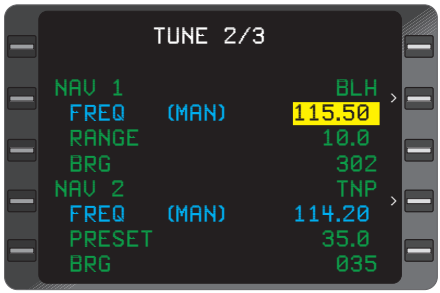


Figure 3-147

When the station is located in the VPU database the identifier will be displayed and the **(KEY)** annunciation will shift to the identifier line. (Figure 3-148)

6. **RANGE** and **BRG** - CHECK.



Figure 3-148

*NOTE: **(MAN)** adjacent to the **FREQ** field indicates that the frequency has been entered manually from the NAV control head.*

Auto Tune Method

Certain control heads will require placement in the Remote Mode at the control head in order to recognize the tuning data from the GNS-XL. Only NAV/DME radios may be placed in the **AUTO TUNE** mode.

DME HOLD, Manual Control Head Tuning, Keyboard Tuning or use of the AUTO/MAN Switch will take the GNS-XL out of the Auto/Tune Mode.

1. **TUNE** Key - DEPRESS to display the NAV **TUNE** Page.
2. Line Select Key - DEPRESS to place cursor over **IDENT** or **FREQ** field of **NAV 1** or **2.** (Figure 3-149)
3. **BACK** Key - DEPRESS, **AUTO?** is displayed in place of **(KEY)** or **(MAN).** (Figure 3-150)
4. **ENT** Key - DEPRESS to place system in AUTO TUNE Mode. After a brief pause the CDU and control head information



Figure 3-149



Figure 3-150

will change to reflect the Identifier chosen by the system. (Figure 3-151)

*NOTE: No prompt is displayed adjacent to the **IDENT** field when system is in AUTO TUNE mode.*

5. **FREQ, RANGE** and **BRG** - CHECK that the **FREQ** of the control head and CDU display agree and that range and bearing are reasonable.



Figure 3-151

TRANSPONDER AND ADF KEYBOARD TUNE

1. **TUNE** Key - DEPRESS to display the page with **XPDR** and **ADF.**
2. Line Select Key - DEPRESS to position the cursor over the desired code or frequency field. (Figure 3-152)
3. Code or Frequency - INSERT and verify new value.(Figure 3-153)
4. **ENT** Key - DEPRESS. **(MAN)** field disappears indicating radios have been keyboard tuned. Verify the code or frequency changes on CDU and control head displays.

*NOTE: **(MAN)** adjacent to **ADF** or **XPDR** indicates that the frequency or code has been entered manually from the control head.*

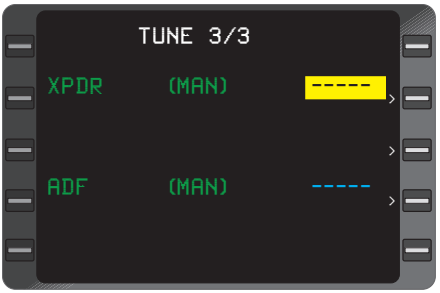


Figure 3-152

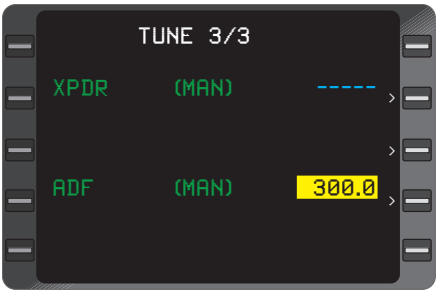


Figure 3-153

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PLANNING PROCEDURES

FUEL PLANNING

1. **PLAN** Key - DEPRESS to display **FUEL STATUS** Page.

*NOTE: **REMAINING** and **RESERVE** quantities are stored in non-volatile memory after system shutdown. Upon system turn-on, **VERIFY INPUTS** is displayed and **REMAINING, RESERVE,** and **FLOW** values will flash.*

2. Line Select Key - DEPRESS to position cursor over **REMAINING** field. (Figure 3-154)
3. Fuel Quantity Remaining - VERIFY or INSERT.
4. **ENT** Key - DEPRESS.
5. Fuel Reserve - VERIFY or INSERT.
6. **ENT** Key - DEPRESS.

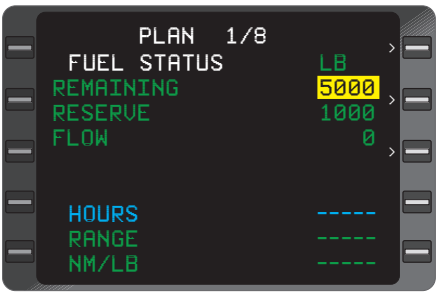


Figure 3-154

7. Fuel Flow - INSERT or VERIFY.

*NOTE: No fuel flow entry is required in the Automatic Fuel Flow mode. All flashing fields must be verified or values inserted using the **ENT** Key, in order for **HOURS** field to display information. **RANGE** and **NM/LB** fields will display information when a valid ground speed is recognized.*

8. **ENT** Key - DEPRESS. If a manual fuel flow is entered the **VERIFY INPUTS** message changes to **LAST INPUT**: and sets the time at :00 minutes. **(MAN)** will be displayed adjacent to the **FLOW** field.

 When the **LAST INPUT** field exceeds 15 minutes, the **REMAINING, RESERVE,** and **FLOW** fields blink indicating verification or update is required. **REMAINING, RESERVE** and **FLOW** must be manually verified.

*NOTE: Auto fuel flow can be reselected by positioning the cursor over the manual fuel flow and depressing the **BACK** Key. **AUTO?** is displayed. The current auto fuel flow is displayed in the cursor. Depressing **ENT** Key will select the auto fuel flow. When going from Manual to Automatic Fuel Flow Mode the **REMAINING, RESERVE** and **FLOW** fields will blink. Verifying inputs is required, Repeat Steps 2 through 7.*

*NOTE: **HOURS** of fuel and **RANGE** are calculated to the **RESERVE** fuel, not **"0"** fuel, unless the **RESERVE** fuel is **"0".***

To change the unit of measurement (LB or KG):

a. Line Select Key - DEPRESS to position the cursor over the **REMAINING** field. DEPRESS the Line Select Key above to position the cursor over the unit field **(LB** or **KG).**

b. **BACK** Key - DEPRESS. The field will display **LB?** or **KG?** to notify the pilot of the pending change. (Figure 3-155)

c. **ENT** Key - DEPRESS. The units field on the title line and specific range line will change. All fuel figures are recalculated to reflect the new units of measurement.

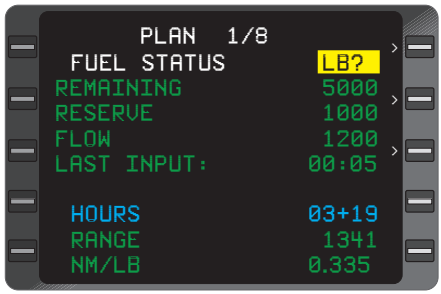


Figure 3-155

TRIP PLANNING

The **TRIP PLAN** Page provides the capability to calculate information for Active or Stored Flight Plans, **DIRECT TO** legs, or Random legs without affecting any of the system's navigation functions.

1. **PLAN** Key - DEPRESS to display **TRIP PLAN** Page.

*NOTE: Initially the **TRIP PLAN** Page will display the Active Flight Plan (if present). The initial leg displayed will be DIRECT TO the current **TO** waypoint on the active flight plan or the first **TO** waypoint on the flight plan selected. (Figure 3-156)*



Figure 3-156

2. Line Select Key - DEPRESS to position the cursor over the **TRIP PLAN** field.

3. Desired Flight Plan - INSERT Flight Plan Number (Figure 3-157) or **"A"** for Active Flight Plan. (Figure 3-158).

4. **ENT** Key - DEPRESS.

*NOTE: If a Flight Plan number is left in the **TRIP PLAN** field and not returned to **"A"**, no updated Active Flight Plan information will be displayed. Figures 3-156 and 3-157 show how the screen appears when an Active FPL has been selected and the airplane is airborne.*

5. **FR** Waypoint - VERIFY or INSERT as required. (Figure 3-159)

6. **ENT** Key - DEPRESS.

7. **TO** Waypoint - VERIFY or INSERT as required.



Figure 3-157

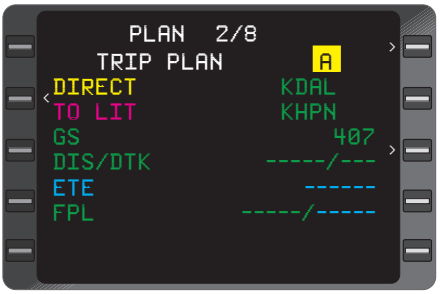


Figure 3-158



Figure 3-159

*NOTE: With **TRIP PLAN A** selected, the **TRIP PLAN** leg will automatically advance to display **DIRECT TO** the current **NAVIGATION** Page **TO** Waypoint each time the **TRIP PLAN** Page is accessed. (Figure 3-160)*

8. **ENT** Key - DE-PRESS (Figure 3-161). Selected leg information and time distance for the remainder of the Flight Plan are displayed. Information between the remaining legs of the Flight Plan can be reviewed by pressing the **ENT** Key for each subsequent leg.

9. Groundspeed - VERIFY. Current aircraft groundspeed is displayed unless a manual entry is made.



Figure 3-160



Figure 3-161

To Enter Manual Groundspeed:

a. Line Select Key - DEPRESS to position cursor over **GS** value field.

b. Groundspeed - INSERT.

c. **ENT** Key - DEPRESS. **(MAN)** will appear adjacent to the **GS** field.

To Return to Automatic Groundspeed:

a. Line Select Key - DEPRESS to position cursor over **GS** value field.

b. **BACK** Key - DEPRESS. **AUTO?** appears in the **GS** field to inform pilot of the pending change and current **GS** is displayed in the cursor.

c. **ENT** Key - DEPRESS.

10. Data - CHECK. When **DIRECT** is displayed all data except **DTK** is updated continuously.

If data is not continuously updated, it will be recalculated each time:

a. The **TRIP PLAN** Page is selected.

b. A **TRIP PLAN** is entered.

c. A leg change is made on the **TRIP PLAN** Page. **ETE** and **FPL** time are recalculated whenever the groundspeed changes.

d. Leg or **GS** change is made on **FUEL PLAN** Page.

*NOTE: **ETA** @ the destination and **RAIM** @ the destination are displayed only when **DIRECT** legs are being viewed. (Figure 3-163)*

*If the **TRIP PLAN** Page is being displayed during a leg change on the **ACTIVE FLIGHT PLAN** the new **TO** Waypoint is not displayed. Exit and return to the **TRIP PLAN** Page to view the updated **TO** Waypoint.*

11. To review the remainder of the Flight Plan: Position cursor over **TO** field, DEPRESS **ENT** Key TWICE to call up next leg. DEPRESS **ENT** Key ONCE for each subsequent leg. (Ground-speed should be updated if necessary.)



Figure 3-162

*NOTE: Information between any desired waypoints can be reviewed by selecting the **TRIP PLAN** Page and entering a **FROM** and **TO** waypoint (Figure 3-162) or performing the present position direct procedures (Figure 3-163). If the **TO** waypoint is not on the selected Flight Plan, the Flight Plan number and origin/destination fields will display dashes.*



Figure 3-163

To update the TRIP PLAN leg to the current TO waypoint with an Active Flight Plan selected:

a. Line Select Key - DEPRESS to position cursor over **TRIP PLAN** field.

b. **ENT** the letter **[A]** in the cursor.

c. **ENT** Key - DEPRESS twice to display information in the data fields.

*NOTE: If an offset waypoint is in the **TO** field the **OFFSET WPT** Page will appear. The **ENT** Key must be depressed again.*

The **TRIP PLAN** leg will display **DIRECT TO** the current **NAVIGATION** Page **TO** waypoint.

Selecting another display page (other than **MSG** and **FUEL PLAN**) and returning to the **TRIP PLAN** Page will also update the leg with **DIRECT TO** the current **NAVIGATION** Page **TO** waypoint.

FLIGHT PLAN FUEL PLANNING

The **FUEL PLAN** Page provides the capability to calculate fuel consumption information for Active or Stored Flight Plans, DIRECT TO Legs or Random Legs without affecting any of the system's navigation functions.

The Fuel Plan Number and Origin and Destination identifiers, TO/FROM leg and groundspeed value on this page will be identical to the **TRIP PLAN** Page. Changing **GS** or the current leg on the **FUEL PLAN** Page also affects the **TRIP PLAN** Page. Pilot initiated changes made to the **FLOW** field on the **FUEL STATUS** Page are reflected on the **FUEL PLAN** Page.

1. **PLAN** Key - DEPRESS to display **FUEL PLAN** Page.

*NOTE: Initially the **FUEL PLAN** will display the Active Flight Plan (if selected). The initial leg displayed will be **DIRECT TO** the current **TO** waypoint from NAV page 1. (Figure 3-164)*

2. Line Select Key - DEPRESS to position the cursor over the **FUEL PLAN** field.



Figure 3-164

3. Desired Flight Plan - INSERT Flight Plan Number (Figure 3-165) or **"A"** for Active Flight Plan.

4. **ENT** Key - DEPRESS.

*NOTE: If a flight plan number is left in the Fuel Plan field and not returned to **"A"**, no updated Active Flight Plan information will appear.*

5. **FR** Waypoint - VERIFY (Figure 3-166) or INSERT as required.

6. **ENT** Key - DEPRESS.

7. **TO** Waypoint - VERIFY or INSERT as required.

*NOTE: With **FUEL PLAN A** selected the **FUEL PLAN** leg automatically advances to display **DIRECT TO** the **NAVIGATION** Page **TO** waypoint each time the **FUEL PLAN** or **TRIP PLAN** Page is accessed.*

8. **ENT** Key - DEPRESS twice to display **LEG** and **FPL FUEL** information. (Figure 3-167).

9. Groundspeed - VERIFY. The current aircraft groundspeed is displayed unless a manual entry is made.



Figure 3-165



Figure 3-166



Figure 3-167

To Enter Manual Groundspeed:

a. Line Select Key - DEPRESS to position cursor over **GS** value field.

b. Groundspeed - INSERT.

c. **ENT** Key - DEPRESS. **(MAN)** will appear adjacent to the **GS** field.

To Return To Automatic Groundspeed:

a. Line Select Key - DEPRESS to position cursor over **GS** value field.

b. **BACK** Key - DEPRESS. **AUTO?** appears in the **GS** field to inform pilot of the pending change and current **GS** is displayed under the cursor.

c. **ENT** Key - DEPRESS.

10. Fuel Flow - VERIFY. Current aircraft total fuel flow is displayed unless a manual entry is made.

To Enter A Manual Fuel Flow:

a. Line Select Key - DEPRESS to position cursor over **FLOW** value field.

b. Fuel Flow - INSERT.

c. **ENT** Key - DEPRESS. **(MAN)** will appear adjacent to the **FLOW** field.

To Return to Automatic Fuel Flow:

a. Line Select Key -DEPRESS to position cursor over **FLOW** field.

b. **BACK** Key - DEPRESS. **AUTO?** appears adjacent to the **FLOW** field to inform pilot of the pending change and current flow is displayed under cursor.

c. **ENT** Key- DEPRESS.

11. Data - CHECK. When **DIRECT** is displayed all data is continuously updated. If data is not continuously updated, it will be recalculated each time:

a. The **TRIP PLAN** Page has changes in **FR/TO** leg or **GS**.

b. The **FUEL PLAN** Page is selected.

c. Leg or **GS** change is made on the **FUEL PLAN** Page. **LEG FUEL** and **FPL FUEL** are recalculated whenever the **FLOW** changes.

d. **FUEL FLOW** is changed on **FUEL STATUS** Page.

*NOTE: The **REM** @ field only appears when a **DIRECT TO** leg is displayed. (Figure 3-169) The **REM** @ Field will be displayed in yellow anytime the REM @ value falls below the reserve fuel programmed on Plan Page 1.*

12. To review the remainder of the Flight Plan: position cursor over **TO** field, DEPRESS **ENT** Key TWICE to call up next leg. (Groundspeed and/or Fuel Flow should be updated if necessary).

*NOTE: Information between any desired waypoints can be reviewed by selecting the **FUEL PLAN** Page and entering a **FROM - TO** leg from the Flight Plan. (Figure 3-168) or by executing the present position direct procedures (Figure 3-169). If the **TO** waypoint is not on the selected Flight Plan, the Flight Plan number and origin/destination fields will display dashes.*



Figure 3-168

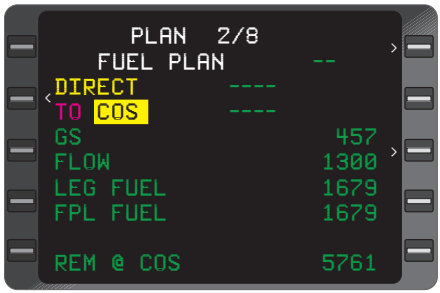


Figure 3-169

To update the Fuel Plan leg to the current TO leg of the Active Flight Plan:

a. Line Select Key - DEPRESS to position cursor over **FUEL PLAN** field.

b. **ENT** the letter **[A]** in the cursor.

c. **ENT** Key - DEPRESS TWICE to display information in data fields.

The **FUEL PLAN** leg displays **DIRECT TO** the current **NAVIGATION** Page **TO** waypoint.

Selecting another display page (other than **MSG** and **TRIP PLAN**) and returning to **FUEL PLAN** Page also updates the leg with **DIRECT TO** the current **NAVIGATION** Page **TO** waypoint.

VERIFYING OR CHANGING DATE AND TIME

DEPRESS the Plan Key until the DATE/GMT Page appears

DATE:

VERIFY or INSERT

Position cursor with Line Select Key and follow procedure in INITIALIZATION PAGE section.

GMT:

VERIFY or INSERT

Position cursor with Line Select Key and follow procedure in INITIALIZATION PAGE section.

*NOTE: If GPS time is available, **GMT** is automatically updated to GPS time. (Figure 3-170)*

TAKEOFF:

The **GMT** at weight-off-wheels plus 10 seconds. (Figure 3-170)

LAND:

The **GMT** at weight-on-wheels. This field is not displayed until 10 seconds after weight-on-wheels occurs. (Figure 3-170)



Figure 3-170

*NOTE: **TAKEOFF** and **LAND** data may be based on groundspeed and/or TAS valids depending upon system configuration.*

FLIGHT TIME:

The elapsed flight time is displayed in hours and minutes. (Figure 3-170)

*NOTE: **TAKEOFF** and Flight times will be altered if the GMT is changed during flight.*

VERIFYING OR CHANGING AIRCRAFT WEIGHT PARAMETERS

This procedure allows the pilot to confirm or adjust basic operating weight, payload, or fuel to current on board data.

1. **PLAN** Key - DEPRESS to display **AIRCRAFT WEIGHT** Page

*NOTE: **BASIC OP WT, PAYLOAD**, and **FUEL ON BOARD** fields will be blinking if update has not been entered after system power up.*

***FUEL USED** will remain dashes until auto fuel flow is detected.*

2. Line Select Key - DEPRESS to place the cursor over flashing weight field. (Figure 3-171)
3. **BASIC OP WT** - VERIFY or INSERT.
4. **ENT** Key - DEPRESS.
5. **PAYLOAD** - VERIFY or INSERT.
6. **ENT** Key - DEPRESS.
7. **FUEL ON BOARD** - VERIFY or INSERT.
8. **ENT** Key - DEPRESS.



Figure 3-171

*NOTE: **VERIFY INPUTS** field disappears and a **GROSS WT** value replaces dashes, and weight fields no longer blink. (Figure 3-172)*



Figure 3-172

VERIFY FUEL** message replaces **VERIFY INPUTS** message when **MAN** fuel flow is being used and **FUEL ON BOARD** has not been verified or updated on **PLAN** Page **1** or **6.

*All blinking weight fields must be verified or values inserted using the **ENT** Key, for **GROSS WT** field to display information.*

RESETTING FUEL USED

1. **PLAN** Key - DEPRESS to display aircraft weight page.
2. Line Select Key - DEPRESS to place the cursor over **FUEL USED**. The field will display **ZERO?**. (Figure 3-172a)

*NOTE: To leave the **FUEL USED** field without changing the value, depress the line select key when the field displays **ZERO?**. The cursor will be removed from the page.*

3. **ENT** Key - DEPRESS to reset fuel used to zero.



Figure 3-172a

SPECIAL PROCEDURES

The following are various procedures that can be performed during navigation, when applicable.

PILOT ENTED LEG CHANGE

1. **NAV** Key - DEPRESS to select **NAVIGATION** Page 1. A pilot entered leg change may be accomplished on any **NAVIGATION** Page with a **FR/TO** field. However, **NAVIGATION** Page 1 is recommended to simplify a reasonability check of **DIS** and **DTK.**
2. Line Select Key - DEPRESS to position the cursor over the **FR** field.
3. FR Waypoint Identifier - INSERT or VERIFY.
4. **ENT** Key - DEPRESS. If inserting a Waypoint Identifier not found in the Active Flight Plan, or an offset waypoint, a Waypoint Page appears. The following procedure should be performed:

 If Waypoint Page Appears:

 a. Waypoint Page Coordinates - VERIFY Database Waypoint or INSERT Waypoint Data.

 To Insert Waypoint Coordinates (cursor over **POS** Field):

 (1) Latitude - INSERT **(N** or **S** first, then degrees, minutes, and hundredths).

 (2) **ENT** Key - DEPRESS.

 (3) Longitude - INSERT **(E** or **W** first, then degrees, minutes, and hundredths).

 b. **ENT** Key - DEPRESS.

5. If VERIFYING current **FR** Waypoint - DEPRESS **ENT** and cursor box expands to enclose both **FR** and **TO** Waypoint Identifiers, which activates the **TO** field.
6. TO Waypoint Identifier - INSERT or VERIFY. (Figure 3-173)
7. **ENT** Key - DEPRESS.

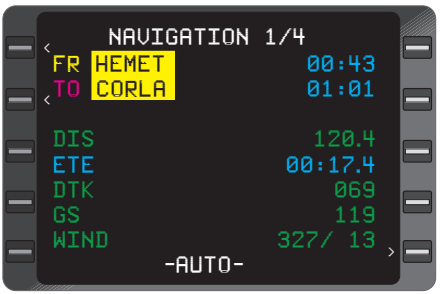


Figure 3-173

If Waypoint Page Appears:

a. Waypoint Page Co-ordinates - VERIFY Database Waypoint or INSERT Waypoint Data. (Figure 3-174)

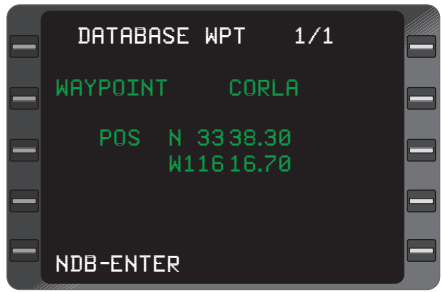


Figure 3-174

To Insert Waypoint Coordinates (cursor over **POS** Field):

(1) Latitude - IN-SERT **(N** or **S** first, then de-grees, minutes, and hundredths).

(2) **ENT** Key - DEPRESS.

(3) Longitude - IN-SERT **(E** or **W** first, then de-grees, min-utes, tenths and hundredths).

b. **ENT** Key - DEPRESS.

8. **DIS, DTK** - CHECK.

*NOTE: The Pilot Entered Leg Change procedure inserts a "fence" indicated by (----) on the **DIRECT TO** and **ACTIVE FPL** pages preventing Auto Leg Change beyond the **TO** waypoint, if the **TO** waypoint was not on the original Active Flight Plan (Figure 3-175) The **MSG** light illuminates and the **SYSTEM MESSAGE** Page displays **NO AUTO LEG CHG**, however the **AUTO** field on **NAVIGATION** Page 1 continues to display **AUTO.***



Figure 3-175

To jump the fence and continue with the flight plan use the ⇾ Key then the Line Select Keys to position the cursor over a way point beyond the fence then press **ENT** *Key*

PREVENTING AUTOMATIC LEG CHANGES

The Auto Leg change function allows the system to automatically sequence from waypoint to waypoint on the Active Flight Plan. When the system is initialized it is in the Automatic Leg Change Mode unless changed by the pilot. The following procedure inhibits automatic leg changes.

1. **NAV** Key - DEPRESS to display **NAVIGATION** Page 1.
2. Line Select Key - DEPRESS to position cursor over **-AUTO-.**
3. **BACK** Key - DEPRESS. Cursor field displays **MAN?** to inform the pilot of the pending change. (Figure 3-176)
4. **ENT** Key - DE-PRESS. The cursor disappears and **-MAN-** remains in the field confirming that leg changes must be made manually. **NO AUTO LEG CHG** message appears on the **SYSTEM MESSAGES** Page, however the **MSG** light does not illuminate.

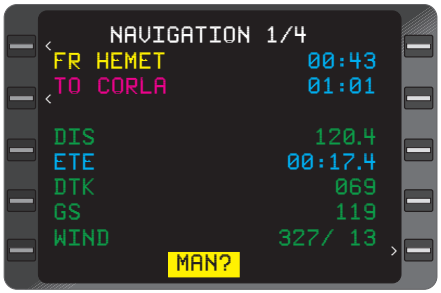


Figure 3-176

Returning to Automatic Leg Change Mode

1. **NAV** Key - DEPRESS to display **NAVIGATION** Page 1.
2. Line Select Key - DEPRESS to position cursor over **-MAN-.**
3. **BACK** Key - DEPRESS. Cursor field displays **AUTO?** to inform the pilot of the pending change.
4. **ENT** Key - DEPRESS. The cursor disappears and **-AUTO-** remains in the field confirming return to the Automatic Leg Change Mode. **NO AUTO LEG CHG** message on the **SYSTEM MESSAGES** Page disappears unless the current **TO** waypoint is the last waypoint on the Active Flight Plan.

*NOTE: Certain HDG Intercept and Pseudo VORTAC Procedures automatically put the leg change mode into **-MAN-**. The pilot must determine if **-MAN-** or **-AUTO-** is appropriate then select the desired leg change mode.*

DEAD RECKONING (DR) TO PRIMARY NAVIGATION MODE - VLF (RPU) ONLY EQUIPPED

*NOTE: System automatically reverts to the Primary Navigation Mode 30 seconds after the **NAV RDY-VERIFY POSITION** message appears. **VERIFY POSITION** message and the **MSG** light remains on. To verify position use Position Check and Update Procedure.*

NAV RDY - VERIFY POSITION message only appears on the **SYSTEM MESSAGES** Page following a system **DR.**

POSITION CHECK AND UPDATE PROCEDURES

Using a Sensor

A position update may also be performed using any one of the navigating interfaced position sensors as a reference. The following procedure describes this action:

1. **HOLD** Key -DEPRESS.
2. Line Select Key - DEPRESS ONCE to place the cursor over the **FIX** field. The field will display **FIX?** (Figure 3-177)
3. **BACK** Key - DEPRESS until the desired sensor (preferably the GPS sensor) to be used as the update reference appears in the cursor. The position of each sensor will appear sequentially along with the **DIF** to the composite position. (Figure 3-178)
4. **ENT** Key - DEPRESS. The cursor will advance to the **DIF** field displaying the direction and distance in degrees, minutes, and hundredths of minutes from the sensor position to the composite position.

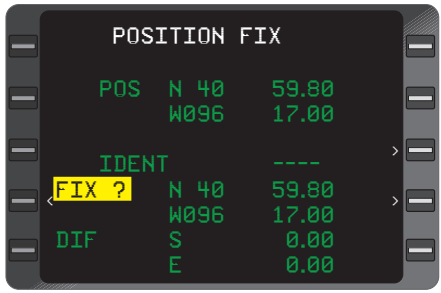


Figure 3-177

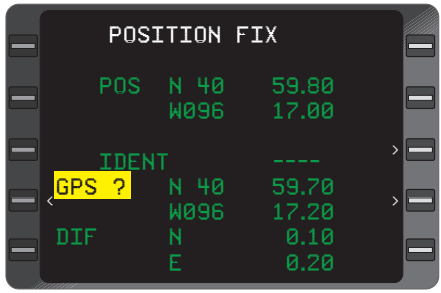


Figure 3-178

5. **ENT** Key - DEPRESS to update composite position to the selected sensor. NAV Page 1 will be displayed.

Over Known Point

This procedure is used to cross check or update the system by over-flying a known reference point such as a radio navaid or visual check point.

1. **HOLD** Key - DEPRESS over known point.
2. Known Point - ENT using either:

Option 1: **IDENT**

or

Option 2: Coordinates for check points not in memory.

Option 1: **IDENT**

a. IDENT - INSERT.

b. **ENT** Key - DEPRESS.

c. Waypoint Page Coordinates - VERIFY.

d. **ENT** Key - DEPRESS. The **DIF** display shows the direction and distance in degrees, minutes and hundredths of minutes from the **FIX** position to the composite position. (Figure 3-179)

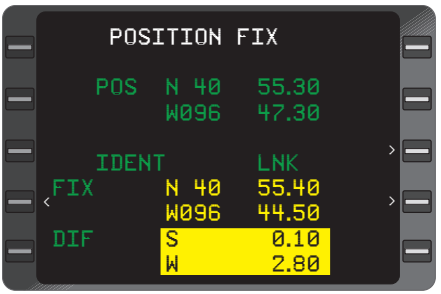


Figure 3-179

e. **ENT** Key - DEPRESS if position update is desired. **NAVIGATION** Page 1 is displayed.

Option 2: Coordinates

a. Line Select Key (cursor over **FIX** coordinates). (Figure 3-180)



Figure 3-180

b. Latitude - INSERT **(N** or **S** first, then degrees, minutes, and hundredths).

c. **ENT** Key - DEPRESS.

d. Longitude - INSERT **(E** or **W** first, then degrees, minutes, and hundredths).

e. **ENT** Key - DEPRESS.

The **DIF** display shows the direction and distance in degrees, minutes and hundredths of minutes from the **FIX** position to the composite position.

f. **ENT** Key - DEPRESS if position update is desired. **NAVIGATION** Page 1 is displayed

*NOTE: If coordinate field flashes after entry, verify coordinates and depress **ENT** again.*

If System Updated:

The VLF (RPU) sensor and the VPU interfaced to the updated CDU are updated as well as the composite position, GPS, and IRS sensors are not updated. Only IRS velocities are required to contribute to the composite position.

If Update Not Desired:

3. **NAV, PLAN, FPL, TUNE, VNAV, HDG,** or ⊣D→ Key - DEPRESS to cancel the position fix.

Using An Offset

This procedure is used to cross-check or update the system using an offset from a known point such as VORTAC Radial and Distance.

Record Radial and Distance at the same time as performing Step 1.

NOTE: Overflying a predetermined radial and distance is not necessary.

1. **HOLD** Key - DEPRESS.
2. Offset Waypoint IDENT - INSERT.

NOTE: If necessary, refer to the procedure for Creating An Offset Waypoint.

3. **ENT** Key - DEPRESS.

4. Recorded Radial - INSERT.
5. **ENT** Key - DEPRESS.
6. Recorded Distance - INSERT (NM and tenths).
7. **ENT** Key - DEPRESS.
8. Waypoint Coordinates - VERIFY for reasonability. (Figure 3-181)
9. **ENT** Key - DEPRESS. The **DIF** display shows the direction and distance in degrees, minutes, and hundredths of minutes from the **FIX** position to the composite position. (Figure 3-182)
10. **ENT** Key - DEPRESS, if position update desired.

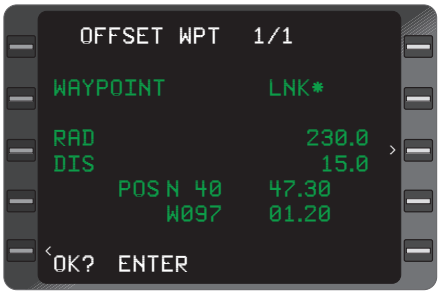


Figure 3-181



Figure 3-182

If System Updated :

The VLF (RPU) sensor and the VPU interfaced to the updated CDU are updated as well as the composite position. GPS, and IRS sensors are not updated. Only IRS velocities are required to contribute to the composite position.

If Update Not Desired:

11. **NAV, PLAN, FPL, TUNE, VNAV, HDG,** or ⊣D→ Key - DEPRESS to cancel the position fix.

PARALLEL COURSE

This procedure is used to establish an offset course (steering reference) parallel to the current leg. This field is inactive when in APPROACH ARMED mode (within 30 nm of the destination airport).

1. **NAV** Key - DEPRESS to display **NAVIGATION** 2/4 Page with **SXTK.**
2. Line Select Key - DEPRESS to position cursor over **SXTK** field.
3. **L** or **R** Key - DEPRESS.
4. Offset Distance - INSERT (NM and tenths). The maximum value that can be entered is 99.9 NM.
5. **ENT** Key - DEPRESS. **XTK** deviation remains referenced to the original track. However the **HSI** will display a centered needle when the SXTK has been captured. **BRG, DIS, ETE** remain referenced to the current **TO** waypoint.

*NOTE: If the system is coupled to the autopilot, the roll command will turn the aircraft to intercept the parallel course at the selected **SXTK** distance.*

*If **XTK** is greater than 12.5NM, VNAV will become INVALID and no vertical deviation information will be displayed.*

Canceling Parallel Course

1. **NAV** Key - DEPRESS to display page with **SXTK.**
2. Line Select Key - DEPRESS to position cursor over **SXTK** field .
3. **BACK** Key - DEPRESS. The cursor field will display **CANCEL?** to inform the pilot of the pending change. (Figure 3-183).



Figure 3-183

4. **ENT** Key - DEPRESS. The steering reference will be to the original desired track.

*NOTE: Any Leg Change (manual or automatic) including **DIRECT TO** will also cancel selected crosstrack **(SXTK).***

MANUAL MAGNETIC VARIATION ENTRY

A manual magnetic variation entry is required north of 70° N latitude and south of 60°S latitude.

1. **NAV** Key - DEPRESS to display **NAVIGATION 3/4** Page with **VAR.**
2. Line Select Key - DEPRESS to position cursor over **VAR** field.
3. Local Variation - INSERT **(E** or **W** first).
4. **ENT** Key - DEPRESS. **(MAN)** will be annunciated adjacent to the **VAR** field.

RETURNING TO AUTOMATIC VARIATION

This checklist must be accomplished to return to Automatic Variation following a Manual Variation entry.

1. **NAV** Key - DEPRESS to display page with **VAR.**
2. Line Select Key - DEPRESS to position cursor over **VAR** field.
3. **BACK** Key - DEPRESS. **AUTO?** will appear in the **VAR** field to inform the pilot of pending change. The automatic variation value will appear in the cursor.
4. **ENT** Key - DEPRESS.

SELECTING ETE, ETA, DIS, OR ALT DISPLAY OPTION (Active Flight Plan Page)

The pilot can view the estimated time enroute, the estimated time of arrival, the distance, or altitude constraints of waypoints on the Active Flight Plan.

1. **FPL** Key - DEPRESS to display **ACTIVE FPL** Page.
2. Line Select Key - DEPRESS to position cursor over **ETE, ETA, DIS,** or **ALT** field. (Figure 3-184)
3. **BACK** Key - DEPRESS to display desired option.



Figure 3-184

4. **ENT** Key - DEPRESS to select option. (Figure 3-185)

*NOTE: To display numbers when the **DIS** option is selected, a Flight Plan must be selected and a leg defined. To display numbers when the **ETE** or **ETA** option is selected, a valid ground speed is required. Altitude constraints and waypoint offsets are only displayed if programmed.*



Figure 3-185

SELECTING NAV PAGE ETA OR ALT DISPLAY OPTION (NAV Page 1, 2, or 3)

The pilot can view the estimated time of arrival or altitude constraint of TO waypoint on the NAV Pages.

Selecting ALT Display:

1. **NAV** Key - DEPRESS to display the **NAVIGATION** Page.
2. Line Select Key - DEPRESS to position the cursor over the **ETA** field. (Figure 3-186)
3. **BACK** Key - DEPRESS. **ALT?** appears in cursor.
4. **ENT** Key - DEPRESS to display Altitude Constraint. (Figure 3-187)

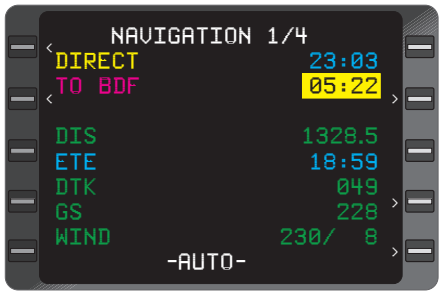


Figure 3-186

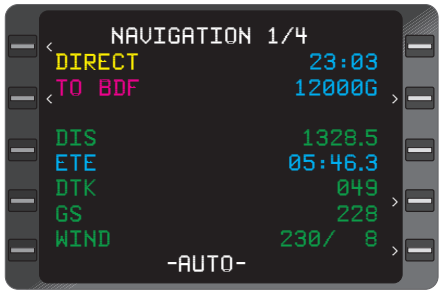


Figure 3-187

*NOTE: Altitude constraint and waypoint offset are only displayed if a VNAV Waypoint is programmed at the **TO** Waypoint and VNAV is valid. The altitude cannot be changed on these pages. The **ALT** display should always be selected during SID, STAR, or Approach procedures.*

To Return to ETA:

5. Line Select Key - DEPRESS to position the cursor over the altitude constraint field.
6. **BACK** Key - DEPRESS. **ETA?** appears in cursor.
7. **ENT** Key - DEPRESS to display **ETA.**

INITIALIZATION ENROUTE VLF (RPU) ONLY

This procedure allows the pilot to initialize the system in flight when only VLF is available. If the aircraft has lost power for more than 7 seconds refer to Special Procedure, Loss of Power In-Flight, for initialization procedure.

POWER ON: (Five minutes minimum prior to reaching known point.)

1. **ON** Key - DEPRESS.
2. **BRT** Key - ADJUST as required.
3. **DATE** and **GMT** - VERIFY. If **DATE** or **GMT** is incorrect it may be updated as described in the **INITIALIZATION** Page procedures.
4. **ENT** Key - DEPRESS to place the cursor over **POS** field.
5. **POS** Coordinates - VERIFY displayed.

*NOTE: **POS** coordinate accuracy is not critical on this step as an update will follow.*

6. **ENT** Key - DEPRESS.
7. Manual TAS - INSERT (if required). If necessary refer to the procedure for Manual TAS Entry under Special Procedures.

Enter Primary Navigation Mode: (Prior to reaching known point)

NOTE: This step is automatic with weight-off-wheels or at 150 knots Auto-TAS.

8. **NAV RDY MSG** - VERIFY. If the system enters the Primary Navigation Mode automatically, **VERIFY POSITION** is displayed on the **SYSTEM MESSAGE** Page, and Step 9 and 10 are not required.
9. **HOLD** Key - DEPRESS.
10. **ENT** Key - DEPRESS TWICE

Position Update:

A position update must be performed to give the system an accurate starting position. An update may be accomplished over a known point or by using an offset. If necessary, refer to the procedure for Position Check and Update.

11. **HOLD** Key - DEPRESS over known point.

12. IDENT or Known Point Coordinates - **ENT.**

If Waypoint Page appears:

a. Waypoint Page Coordinates - VERIFY or INSERT.

b. **ENT** Key- DEPRESS.

13. **DIF** - CHECK. Since the system was initialized in-flight using an approximate position, the **DIF** check is not used to determine the suitability of an update, but is used to check for reasonability or manual entry errors.

14. **ENT** Key - DEPRESS.

Enter the following information as required:

- Active Flight Plan
- Initial Leg
- Manual Magnetic Variation (only for latitudes north of 70N and south of 60S)

MANUAL TAS ENTRY
only VLF is available

NOTE: Manual TAS cannot be entered if a valid TAS is present from the Airdata Computer.

If the system is using an unaided VLF/OMEGA sensor (no heading, TAS or IRS velocities available) manual TAS entry is required when fewer than three stations are received. **MAN TAS REQD** message appears on the **SYSTEM MESSAGE** Page.

TAS must be manually entered if the aircraft does not have an auto-**TAS** system or the auto-**TAS** input has failed. If **TAS** is entered manually, no wind will be displayed. If the auto-**TAS** input returns, it will override the manual entry.

To Enter Manual TAS:

1. **NAV** Key - DEPRESS to display page with **TAS.**
2. Line Select Key - DEPRESS to place the cursor over **TAS** field.
3. **TAS** - INSERT in knots.
4. **ENT** Key - DEPRESS. **(MAN)** will appear adjacent to the **TAS** field. (Figure 3-188)

*NOTE: Maximum manual **TAS** value that can be entered is 850 knots.*



Figure 3-188

MANUAL HEADING ENTRY only if IRS or VLF is available

A manual heading entry will be possible only if the system is using a VLF/OMEGA sensor with H-field antenna and the automatic heading input has failed. If the automatic heading input returns it will override the manual entry without operator action.

If the manual heading is required a **"MAN HDG REQD"** message will appear on the **SYSTEM MESSAGES** Page.

To Enter A Manual Heading:

1. **NAV** Key - DEPRESS to display page with **HDG.**
2. Line Select Key - DEPRESS to place the cursor over **HDG** field.
3. **HDG** - INSERT.
4. **ENT** Key - DEPRESS. **(MAN)** will appear adjacent to the **HDG** field. (Figure 3-189)

*NOTE: **SYSTEM MESSAGES** Page will display **USING MAN HDG** message.*



Figure 3-189

VLF/OMEGA STATION DESELECTION

The following procedure allows a VLF Communication or Omega station to be removed from an RPU's navigation solution.

NOTE: This procedure should be used with caution since stations are automatically deselected by the computer if unsuitable for navigation.

1. **NAV** Key - DEPRESS to display **NAVIGATION** Page 4.
2. Line Select Key - DEPRESS to position the cursor over **VLF** sensor field. (Figure 3-190)
3. **ENT** Key - DEPRESS.
4. **NAV** or **NXT** Key - DEPRESS to sequence through **VLF SUBSECTION**. Select either VLF Comm or Omega Station List Page. (Figure 3-191)
5. Line Select Key - DEPRESS to position cursor over station identifier to be deselected. (Figure 3-191)
6. **BACK** Key - DEPRESS. (Figure 3-192) **DESELECT?** will appear to inform the pilot of the pending change.
7. **ENT** Key - DEPRESS to DESELECT station.

To restore a deselected station:

a. Line Select Key - DEPRESS to position the cursor over the station identifier to be restored.

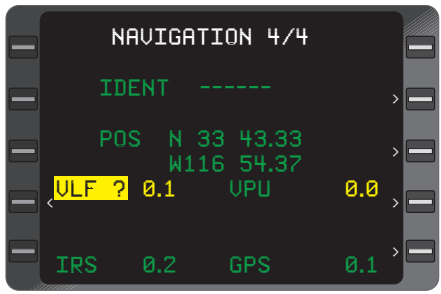


Figure 3-190

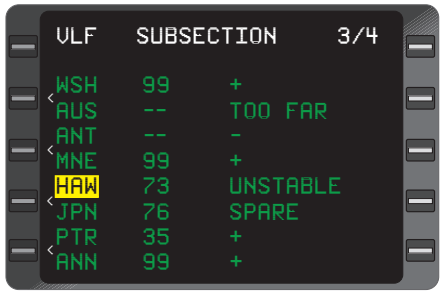


Figure 3-191

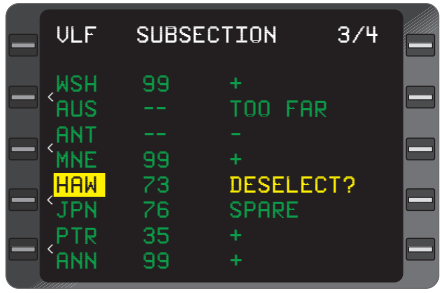


Figure 3-192

b. **BACK** Key - DEPRESS. **RESTORE?** will appear to inform the pilot of the pending change.

c. **ENT** Key - DEPRESS to restore the station.

SENSOR DESELECTION

The deselection of a position sensor on **NAVIGATION** Page 4 completely eliminates the sensor's contribution to the composite (blended) position. This is only recommended if the pilot can determine which position keeping sensor is inaccurate or by flying over a known location and then comparing the sensor position against the known position.

To Deselect a Sensor:

1. **NAV** Key - DEPRESS until **NAVIGATION** Page 4 is displayed.
2. Line Select Key - DEPRESS to position the cursor over sensor to be deselected.
3. **BACK** Key - DEPRESS. **OUT?** will appear to inform the pilot of the pending change. (Figure 3-193)
4. **ENT** Key - DEPRESS. **"OUT"** will remain in the sensor field and **"DESELECTED"** appears beside the corresponding sensor on the **SENSOR MESSAGES** Page.

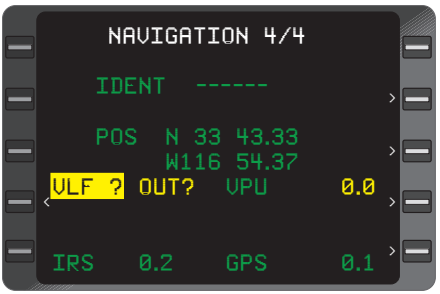


Figure 3-193

To Restore a Sensor:

a. **NAV** Key - DEPRESS to display **NAVIGATION** Page 4.

b. Line Select Key - DEPRESS to position cursor over sensor to be restored.

c. **BACK** Key - DEPRESS. **IN?** appears to inform the pilot of the pending change.

d. **ENT** Key - DEPRESS to restore the sensor.

NOTE: If GPS is deselected, the remaining sensor radial error fields will turn from yellow to green, indicating that those sensors are now contributing to the composite position. Under normal circumstances, the GPS is the sole contributor to the composite position. The IRS

contributes to GPS accuracy by providing GPS with velocity aiding. It will always be displayed in green.

EXTERNAL WAYPOINT ACCEPTANCE

Up to 99 external waypoints may be accepted from an interfaced radar or EFIS system.

When a waypoint is generated from this equipment, a DIRECT TO leg change is made to that waypoint.

The generated waypoint will be designated EX#01 to EX#99. (Figure 3-194)

As the External Waypoint **(EX#)** is off the Flight Plan it will be separated from the Active Flight Plan waypoint sequence by a fence - - - - -. **"NO AUTO LEG CHG"** message will appear on the **SYSTEM MESSAGES** Page. The following procedure may be used to link the **EX#** waypoint into the Flight Plan sequence.

1. Key - DEPRESS. The display will show Direct To the **EX#** waypoint with the waypoints of the Active Flight Plan listed below. (Figure 3-195).
2. Line Select Key - DEPRESS to position the cursor over the waypoint to follow the EX# waypoint. (Figure 3-196)
3. **EX#** Waypoint Identifier - INSERT.

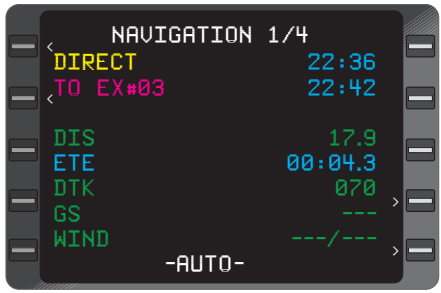


Figure 3-194

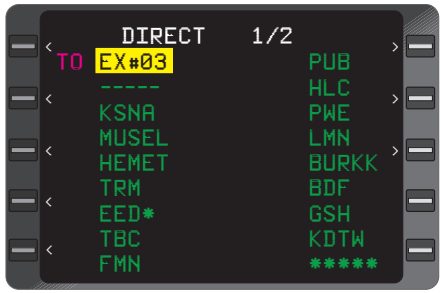


Figure 3-195

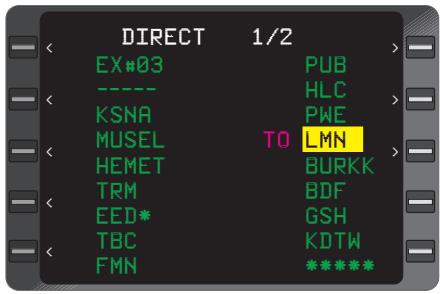


Figure 3-196

4. **ENT** Key - DEPRESS.

*NOTE: The **EX#** waypoint identifier will flash if an unassigned number is entered. **EX#** waypoint coordinates can ONLY be assigned by an external source (radar or EFIS).*

5. Waypoint Page Coordinates - VERIFY.

6. **ENT** Key - DEPRESS.

7. Waypoint Sequence - VERIFY. (Figure 3-197)

8. **ENT** Key - DEPRESS. CDU display will automatically advance to **NAVIGATION** Page 1. **"NO AUTO LEG CHG"** message will be removed from the **SYSTEM MESSAGES** Page.

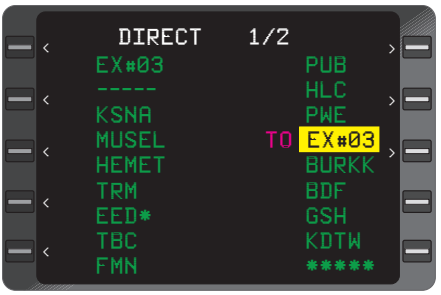


Figure 3-197

PRESENT POSITION AS A WAYPOINT

A special waypoint location is reserved for storing present position coordinates as a waypoint. The identifier for this waypoint is inserted as **"#1."** As well, the identifier may be used as a parent identifier for an offset waypoint by adding an asterisk ("*").

Waypoint **#1** is redefined each time the **HOLD** Key is depressed. An example of the application of waypoint **#1** is to store the coordinates of a point overflown to which you may wish to return. This is accomplished by depressing the **HOLD** Key directly over that desired point. In this case these coordinates would be stored under identifier **"#1"** until either the HOLD Key is depressed again, updating **#1**, or the system is shut down.

*NOTE: Since waypoint **#1** is frequently redefined, it is not retained in non-volatile memory and the identifier **#1** cannot be entered on a stored flight plan. However, the coordinates of WPT #1 can be stored on a Flight Plan by making them part of a pilot entered waypoint. See page 3-127 for creating pilot entered waypoints. It does, however, use up one of the 999 available waypoints, as do **#OFF, #0** and **EX** (external) Waypoints.*

NAVIGATION AT EXTREME LATITUDES (North of 70° N or South of 60° S)

CAUTION: THE PROCEDURES LISTED IN THIS SECTION CONTAIN INSTRUCTIONS FOR OPERATION OF THE GNS-XI AT SPECIFIED LATITUDES BEYOND THE AUTO-COMPUTED MAGNETIC VARIATION MODEL. IN ALL CASES THE FLIGHT CREW OF ANY AIRCRAFT OPERATING AT THESE LATITUDES MUST CONSULT THE FLIGHT MANUAL SUPPLEMENT IN ORDER TO OBTAIN SATISFACTORY PERFORMANCE AND ACCURACY.

Manual Magnetic Variation Entry

1. **NAV** Key - DEPRESS to display until **NAVIGATION** Page 3 is displayed.
2. Line Select Key - DEPRESS to place cursor over the **VAR** value field.
3. Local Variation - INSERT **(E** or **W** first).
4. **ENT** Key - DEPRESS. **(MAN)** will be annunciated adjacent to the **VAR** field.

Returning To Automatic Variation

1. **NAV** Key - DEPRESS until **NAVIGATION** Page 3 is displayed.
2. Line Select Key - DEPRESS to place cursor over the **VAR** value field.
3. **BACK** Key - DEPRESS. **AUTO?** will be displayed to advise the pilot of the impending change.
4. **ENT** Key - DEPRESS.

*NOTE: Insertion of **E** or **W** followed by **ENT** will also revert the system to Auto Variation.*

TRUE HEADING

Aircraft Equipped With TRUE/MAG Switch

1. TRUE/MAG Switch - Place in TRUE position.

*NOTE: Once the TRUE/MAG Switch is placed in the TRUE position **T** is displayed adjacent to **BRG, HDG** and **TK** since they are now referenced to true north.*

Aircraft Not Equipped With A TRUE/MAG Switch

NOTE: This procedure must be accompanied by the input of TRUE heading into the system.

1. **NAV** Key - DEPRESS until **NAVIGATION** Page 3 appears.
2. LINE SELECT Key - DEPRESS to place cursor over the **VAR** field.
3. INSERT **E0.**
4. **ENT** Key - DEPRESS.

*NOTE: The Variation is now **E0** and the system will be referenced to TRUE north. There will be no **T** annunciation adjacent to **BRG, HDG** and **TK**.*

SET HEADING ENTRY

When an IRS is placed in the Attitude Mode the message ENTR SET HDG appears on the SENSOR MESSAGES Page. It is necessary to enter a set heading in order to allow the IRS to output valid magnetic heading data.

To Enter A Set Heading:

1. **NAV** Key - DEPRESS until **NAVIGATION** Page 3 is displayed. The heading field may appear as dashes. (Figure 3-198)
2. Line Select Key - DEPRESS to place the cursor over **HDG** field. The last valid heading value appears. (Figure 3-199)
3. **HDG** - VERIFY or INSERT.
4. **ENT** Key - DEPRESS



Figure 3-198

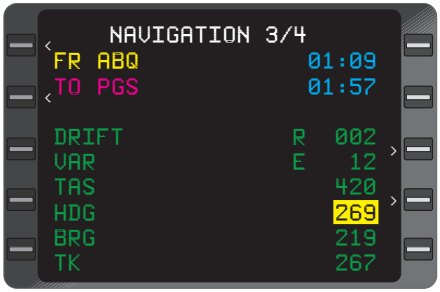


Figure 3-199

*NOTE: In some cases, **(MAN)** will appear in the **HDG** field and the **SYSTEM MESSAGES** Page will display **USING MAN HDG** message.*

LOSS OF POWER IN FLIGHT

THIS PROCEDURE SHOULD ONLY BE USED IN A REMOTE AREA WHERE NAVAIDS ARE UNAVAILABLE AND THERE IS REASON TO BELIEVE THE SENSORS CONTRIBUTING TO THE COMPOSITE POSITION MAY BE IN ERROR.

The procedure allows the pilot to initialize enroute when the aircraft has sustained a loss of power for more than 7 seconds. The Power Off Waypoint, **"#OFF",** provides a snapshot of system data at the moment power was lost.

To Initialize when power is restored:

*NOTE: When power returns, system performs Self Test and displays the **INITIALIZATION** Page.*

1. **DATE** and **GMT** - VERIFY or ENT current **DATE** and **GMT** if required.
2. **ENT** Key - DEPRESS to place the cursor over the **POS** field, if required.

NOTE: The coordinates are a rolling display of the real time blended position of the sensors being updated.

3. **ENT** Key - DEPRESS to accept real time position.
4. **HOLD** Key - DEPRESS.
5. Power Off Waypoint IDENT - INSERT **"#OFF".** (Figure 3-200).
6. **ENT** Key - DEPRESS.
7. **MINUTES OFF, LAST TK, LAST GS** - VERIFY and RECORD for future use. (Figure 3-201).

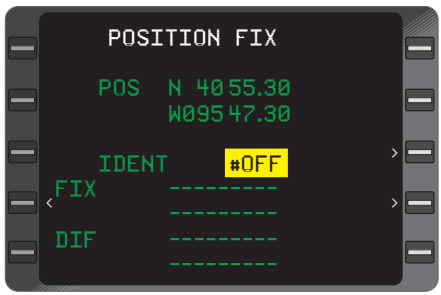


Figure 3-200

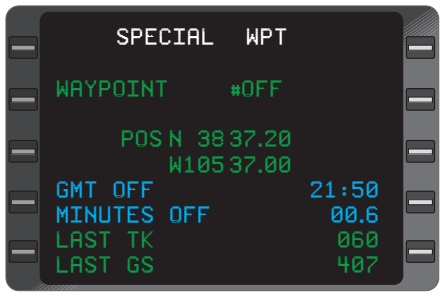


Figure 3-201

8. **BACK** Key - DEPRESS to return to **HOLD** Page.

*NOTE: An Offset Waypoint **(#OFF*)** can be input with a radial based on the **LAST TK** value and distance calculated from the **LAST GS** value as well as the time elapsed from power off, provided significant changes to aircraft track or groundspeed have not been made. If the aircraft has turned or if the speed has changed, the pilot should estimate the track and distance traveled since the loss of power.*

9. Offset Waypoint IDENT - INSERT.
10. **ENT** Key - DEPRESS.
11. Recorded or Estimated Radial - INSERT **LAST TK** value or averaged value. (Figure 3-202)
12. Distance - INSERT calculated distance in NM and tenths.
13. **ENT** Key - DEPRESS.
14. Waypoint Coordinates - VERIFY for reasonability.
15. **ENT** Key - DEPRESS.
16. **DIF** - CHECK

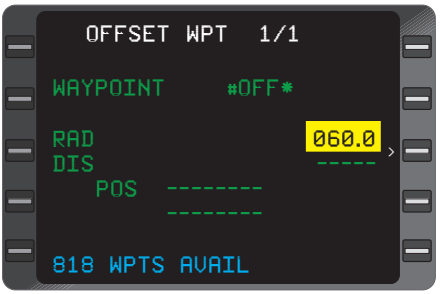


Figure 3-202

If Update Desired:

17. **ENT** Key - DEPRESS. The VLF (RPU) sensor and the VPU interfaced to the updated CDU are updated as well as the composite position.

If Update Not Desired:

18. **NAV, PLAN, FPL, TUNE, VNAV, HDG,** or ⊖ Key - DEPRESS to cancel the HOLD.

CREATING/CHANGING PILOT ENTED (PERSONALIZED) WAYPOINTS

A personalized waypoint may be created by entering a non-NDB (Nav Data Base) waypoint identifier and inserting the desired position coordinates on the Waypoint Page.

The CDU has non-volatile storage for up to 999 waypoints which are retained in memory ONLY if the waypoints are entered on a Stored Flight Plan. The ICAO identifiers stored in the database can not be used for personalized waypoints.

Attempting to enter more than 999 pilot entered waypoints in memory causes **MEM FULL** to be displayed on the **FLIGHT PLAN** Page. The message light will flash and **WPT MEM FULL** will be displayed on the **SYSTEM MESSAGES** Page.

Select the desired Flight Plan and position the cursor over the desired field. If necessary, refer to the procedure for Creating a Flight Plan or Modifying a Flight Plan.

Creating Pilot Entered (Personalized) Waypoints:

1. Personalized IDENT- INSERT.
2. **ENT** Key- DEPRESS. (Figure 3-203)
3. Latitude- INSERT (**N** or **S** first, then degrees, minutes, and hundredths).
4. **ENT** Key - DEPRESS.
5. Longitude- INSERT (**E** or **W** first, degrees, then minutes, and hundredths).

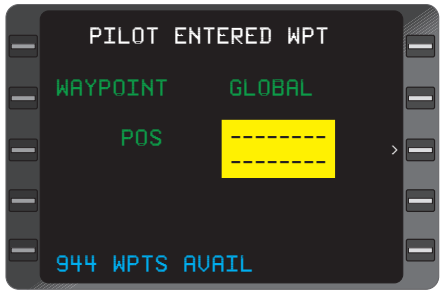


Figure 3-203

6. **ENT** Key- DEPRESS. The display will change to the appropriate **FLIGHT PLAN** or **DIRECT** Page.

Changing Pilot Entered (Personalized) Waypoints:

1. Personalized IDENT- INSERT.
2. **ENT** Key- DEPRESS. **PILOT ENTED WPT** Page will appear.
3. Line Select Key - DEPRESS to position the cursor over **POS** field.
4. Repeat Steps 4 - 6 above.

*NOTE: If an offset waypoint from a pilot entered waypoint is programmed, the **RAD** and **DIS** can be changed, but the coordinates cannot be manually inserted.*

CREATING AN OFFSET WAYPOINT

This procedure enables the system to create a waypoint at a given radial and distance from a known point. The known point (parent waypoint) may be any stored personalized or database waypoint.

An offset waypoint may be inserted in any Waypoint IDENT field. The offset waypoint is retained in memory after system shutdown ONLY if entered on a Stored Flight Plan.

Position the cursor over the desired waypoint IDENT field.

NOTE: The offset waypoint uses station declination, if available, or it uses the calculated magnetic variation of the parent waypoint. All waypoints defined by a VHF Navaid in the National/International Airspace System are based on the VHF Navaid station declination. Since the magnetic variation and station declination may not be the same at a given Navaid, the calculated position and the defined FMS position may differ.

1. Parent Waypoint IDENT-INSERT with an * following the entry. (Figure 3-204)

*NOTE: More than one offset waypoint is allowed from one parent, using ***, *1, *A1,** etc., as identifying notation.*



Figure 3-204

2. **ENT** Key-DEPRESS.

NOTE: If field blinks, Parent Waypoint does not exist in CDU memory or in database and must be defined on a Flight Plan Page.

3. Desired Radial- INSERT. The degrees can be entered as whole numbers and the .0 will be loaded automatically. i.e. type 77, 077.0 will be displayed. If a of a degree is desired, all 4 digits must be entered. 0775 will be displayed as 077.5, 3001 will be displayed as 300.1 etc.

4. **ENT** Key-DEPRESS.

5. Desired Distance-INSERT (NM and tenths, 1999.9 NM maximum).

6. **ENT** Key-DEPRESS.

7. **POS** Coordinates- VERIFY for reasonability. (Figure 3-205)
8. **ENT** Key-DEPRESS.

NOTE: An Offset Waypoint is used in the same manner as any other waypoint.

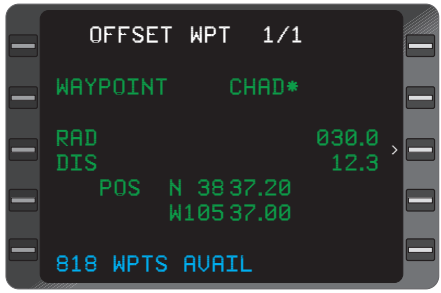


Figure 3-205

PERFORMING FDE PREDICTION FOR OCEANIC/REMOTE OPERATION

This procedure must be performed prior to departure for a flight plan involving Oceanic/Remote operation where GPS is to be the sole source of navigation. The maximum segment length for which FDE prediction can be calculated is 25 hours at a ground speed of 100 Kts.

1. **PLAN** Key - DEPRESS to display **PLAN 7/8 FDE** Page. See Figure 3-206
2. Line Select Key - DEPRESS if necessary to place the cursor over the **DEPART DT** field. Enter the departure date for which FDE prediction is desired.

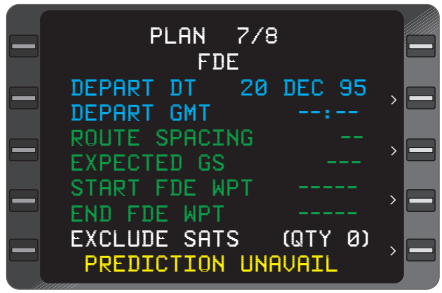


Figure 3-206

NOTE: The date entered may be up to six months either side of the current date.

3. **ENT** Key - DEPRESS.
4. Enter the departure time for which FDE prediction desired.
5. **ENT** Key - DEPRESS.



Figure 3-207

6. Enter the desired route spacing in nautical miles. 60NM is normal.

7. **ENT** Key - DEPRESS.

8. Enter the expected ground speed in knots. A value of 100 to 999 Kts may be entered.

9. **ENT** Key - DEPRESS.

10. Enter the starting waypoint of the active flight plan leg for which FDE prediction is being calculated. Pressing the **BACK** Key will cycle through the waypoints on the active flight plan. Dashes are displayed prior to the last waypoint on the flight plan. Pressing **ENT** while the dashes are displayed will clear the start and end waypoints, resulting in an undefined Oceanic/Remote segment.

11. **ENT** Key - DEPRESS.

12. Enter the ending waypoint of the active flight plan leg for which FDE prediction is being calculated. The **BACK** and dashes operate the same here as in the previous step.

13. **ENT** Key - DEPRESS.

14. If no satellites are to be excluded from the FDE prediction, DEPRESS the lower right Line Select Key and proceed to Step 20. If specific satellites are to be excluded from the FDE prediction, go to Step 15.

15. **ENT** Key - DEPRESS to display the **FDE EXCLUDE SATS 1/1** Page. See Figure 3-208

16. Line Select Key - DEPRESS to position the cursor in the **SAT #** field.

17. Enter the satellite number to be excluded.

18. **ENT** Key - DEPRESS. The satellite number is now displayed in the **EXCLUDED SATS LIST** field.

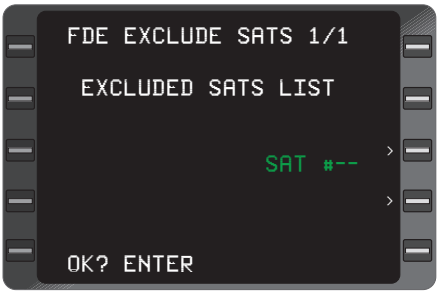


Figure 3-208

*NOTE: Entering a number already listed and pressing **ENT** will remove the number from the list. Pressing the Line Select Key next to **CLEAR ALL** and pressing **ENT** will remove all satellites from the exclusion list.*

19. **ENT** Key - DEPRESS when all desired satellites are entered. **PLAN 7/8 FDE** Page will again be displayed.

20. **START CALC? ENT** is displayed at the bottom of the screen. See Figure 3-210



Figure 3-209



Figure 3-210

21. **ENT** Key - DEPRESS. **PLAN 8/8 FDE COMPUTATION** Page is now displayed. **COMPUTING - STANDBY** will flash while FDE prediction is being calculated and the percentage completed will be shown. When the prediction calculation is complete, an **FDE** and **NAV AVAILABLE** or **UNAVAILABLE** message will be displayed as shown in Figures 3-212 and 3-213.



Figure 3-211



Figure 3-212



Figure 3-213

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SECTION 4

VLF/OMEGA TRANSMITTER SITES

VLF COMMUNICATIONS STATIONS

	LETTER DESIGNATION	
WASHINGTON USA	(WSH)	Jim Creek, Washington
AUSTRALIA	(AUS)	Northwest Cape, Australia
ANTHORNE	(ANT)	Anthorne, England
MAINE	(MNE)	Cutler, Maine USA
HAWAII	(HAW)	Lualualei, Hawaii USA
GREAT BRITAIN	(GBR)	Rugby, England
	or	
PUERTO RICO	(PTR)	Puerto Rico
ANNAPOLIS	(ANN)	Annapolis, Maryland USA

OMEGA NAVIGATIONAL NETWORK

	LETTER DESIGNATION	
NORWAY	(NOR)	Aldra, Norway
LIBERIA	(LIB)	Liberia, Africa
HAWAII	(HAW)	Haiku, Hawaii USA
NORTH DAKOTA	(DAK)	LaMoure, North Dakota USA
LA REUNION	(REN)	Reunion Island, Indian Ocean

OMEGA NAVIGATIONAL NETWORK (CONTINUED)

ARGENTINA	(ARG)	Gulfo Nuevo, Argentina
AUSTRALIA	(AUS)	Darriman, Australia
JAPAN	(JPN)	Tsushima, Japan

SECTION 5

DATABASE UPDATE

DATA BASE UPDATE PROCEDURES

1. Apply aircraft power.
2. Open the hinged door located at the top of the CDU.
3. Insert current Data Base Update card firmly into the slot. The double row of holes on the forward edge of the card must be inserted first, with the write protect slot toward the right edge of the card. Insert the card at the same level as the eject button located at the right edge of the slot.

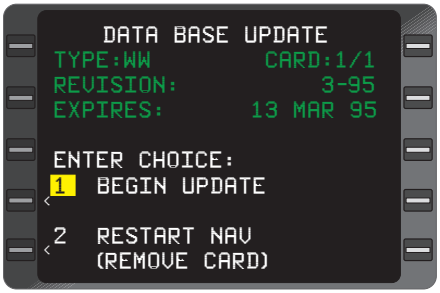


Figure 5-1

4. **ON** Key - DEPRESS to turn on system. Figure 5-1 appears.

TO UPDATE

CAUTION: IF AN INTERRUPTION OF THE UPDATE PROCESS IS DESIRED, REMOVE THE UPDATE DISK. DO NOT TURN OFF POWER TO STOP THE UPDATE.

5. Line Select or **1** Key - DEPRESS to select **BEGIN UPDATE**, if required. If update is not desired, depress the Line Select or **2** Key to select restart NAV.
6. With cursor over option **1, ENT** Key - DEPRESS. The Update - Data Base Page and, the message **"X" % "COMPLETE"** appear indicating the update is in progress. (Figure 5-2)

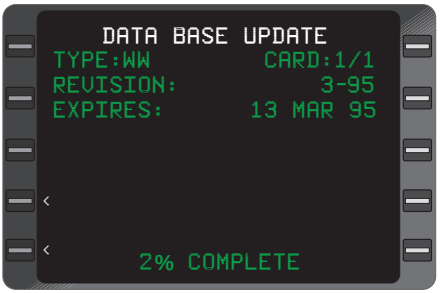


Figure 5-2

WHEN UPDATE IS COMPLETE

If the update is successful, Figure 5-3 is displayed.

8. Turn system OFF or DEPRESS **ENT** Key to restart navigation.



Figure 5-3

IF UPDATE FAILS

If the database update fails, Figure 5-4 is displayed.

Depress the **1** Key then **ENT** Key to retry the update or use the following procedure. Sometimes when a retry is initiated, a display such as that shown in Figure 5-5 may be seen momentarily.

1. Update Card - REMOVE.
2. Turn system OFF.
3. Update Card - RE-INSERT into CDU.
4. Turn system ON and retry Update using UPDATE PROCEDURE, Steps 1-7.

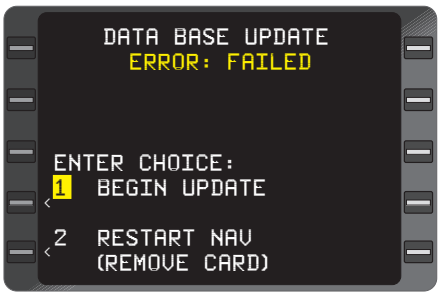


Figure 5-4

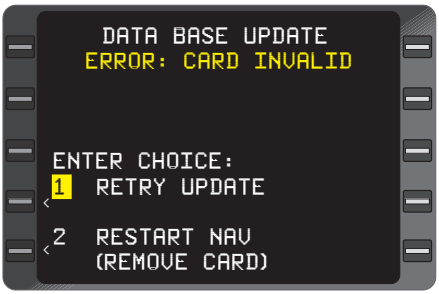


Figure 5-5

SECTION 6

LIST OF ABBREVIATIONS AND DEFINITIONS

	DEFINITION
A	AT or ABOVE (Ref. to VNAV Altitude Constraint)
ADC	Air Data Computer
ADF	Automatic Direction Finder
AFIS	Airborne Flight Information System
AFM	Aircraft Flight Manual
AHRS	Attitude Heading Reference System
ALT	Altitude
APRCH	Approach
AR	DME Arc
ARINC	Aeronautical Radio, Inc.
ARP	Airport Reference Point
ASU	Antenna Switching Unit
ATC	Air Traffic Control
AUTO	Automatic
AZ	Satellite Azimuth Relative to Aircraft Position
B	AT or BELOW (Ref. VNAV Altitude Constraint)
Baro	Barometric Altitude
BASIC OP WT	Basic Operating Weight
BRG	Bearing to Waypoint
BRT	Bright

	DEFINITION
CDI	Course Deviation Indicator
CDU	Control Display Unit
CH	Channel
CLIMB GRAD	Current Aircraft Climb Performance in feet per Nautical Mile
CRUISE ALT	Cruise Altitude
D→	Direct To (Laterally)
DB	Database
DEF	Default
DIF	Difference
DIR	Direct
DIS	Distance
DME	Distance Measuring Equipment
DN	Down
DTK	Desired Track
EFIS	Electronic Flight Instrument System
EL	Satellite Elevation Above the Horizon
ELEV	Elevation
ENRTE	Enroute
EST CROSSING	Estimated Crossing Altitude
ETA	Estimated Time of Arrival
ETA @	Estimated Time of Arrival at Destination
ETE	Estimated Time Enroute
EXP	Expires

	DEFINITION
FCF	Final Course (Alignment) Fix.
FL	Flight Level
FAF	Final Approach Fix
FDE	Fault Detection and Exclusion. Detection meaning the capability of the system to detect a satellite failure that will affect navigation. Exclusion meaning the capability of the system to exclude one or more failed satellites from the prediction solution, thus, preventing a satellite failure from affecting navigation.
FMS	Flight Management System - includes CDU and optional RPU
FPA	Flight Path Angle
FPL	Flight Plan
FPM	Feet per minute
FR	From Waypoint
FREQ	Frequency
FT	feet
G	Glide path (Ref. to VNAV Altitude Constraint)
GMT	Greenwich Mean Time
GPS	Global Positioning System
GS	Groundspeed
HDG	Heading
HDOP	Horizontal Dilution of Precision
HLTH	Satellite Health (Good or Bad)
HP	Holding Pattern

	DEFINITION
HPE	Horizontal Position Error (A Quality Factor for the GPS.)
HSI	Horizontal Situation Indicator
IAF	Initial Approach Fix
ICAO	International Civil Aviation Organization
IDENT	Identifier
ILS	Instrument Landing System
INBOUND CRS	Inbound Holding or Procedure Turn course
INS	Inertial Navigation System
IRS	Inertial Reference System
Jeppesen	Name of Navigation Database Source
KEY	CDU Keyboard Entry
KG	Kilogram/Kilograms
kHz	Kilohertz
LAT	Latitude
LB	Pound/Pounds
LEG DIST	Leg Distance
LON	Longitude
MAG	Magnetic
MAG VAR	Magnetic VariationMAN Manual Entry
MAN ALT	Manual Altitude

	DEFINITION
MAP	Missed Approach Point
MHz	Megahertz
MSG	Message
NAV	Navigation
NAVAID	Navigation Aid (Typically a Radio Station Providing VOR and/or DME Position Data)
NDB	NAV Database or Non-Directional Beacon
NM	Nautical Miles
NOTAM	Notice to Airman
NX	Next Waypoint
NXT	Next
OM	Outer Marker
POS	Position (Present or Waypoint)
PRESEL ALT	Preselect Altitude
#PRESL	Preselected Altitude Profile Point
PREV or PRV	Previous
PRN	Pseudo Random Noise (GPS Satellite Number)
PT	Procedure Turn
RAD	Radial
RAIM	Receiver Autonomous Integrity Monitoring

	DEFINITION
REM	Remaining
REQ FPM	Required Feet Per Minute
RCVD	Received
RMI	Radio Magnetic Indicator
RNAV	Area Navigation or type of Non Precision Approach
RNG	Range
RPU	Receiver Processor Unit (Contains the VLF Omega)
RW	Runway
SAT	Satellite (PRN) Number
SID	Standard Instrument Departure
SM	Software MOD Level
SNR	Signal to Noise Ratio
STAR	Standard Terminal Arrival
SXTK	Selected Crosstrack
T	True (Heading or Track) or whether a Satellite is being tracked or not.
TACAN	TACtical Air Navigation
TAS	True Airspeed
TK	Track Angle
TKE	Track Error
#TOC	Top of Climb Profile Point
#TOD	Top of Descent Profile Point

	DEFINITION
TRANS LEVEL	Transition Level (The Altitude at which Altitudes Become Flight Levels)
TRCK	Track (Satellite Status)
TRMNL	Terminal
VAR	Magnetic Variation
VERT DEV	Vertical Deviation
VHF	Very High Frequency
VLF	Very Low Frequency
VNAV	Vertical Navigation
VOR	VHF Omnirange
VORTAC	VHF Omnidirectional Range TACAN
VPU	VORTAC Position Unit
Waypoint	A Point Defined in Space Used in Navigation
WPT	Waypoint
WW	NDB Worldwide Coverage
XPDR	Transponder
XTK	Crosstrack

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SECTION 7

AFIS

AIRBORNE FLIGHT INFORMATION SYSTEM

AND

SATELLITE DATA COMMUNICATIONS SYSTEM

This section applies only to aircraft equipped with an AFIS system.

The purpose of this section is to acquaint users of AFIS Flight Plan and Weather Advisory Services with the equipment, its capabilities, and its operation. AFIS services are ADVISORY only, as they contain elements provided by the National Weather Service and information supplied by the pilot. Therefore, it is the responsibility of the pilot in command to exercise reasonable and prudent judgment in the use of these ADVISORY services.

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DESCRIPTION

AFIS is an Airborne Flight Information System that provides integrated flight planning and performance management interfaces to the GNS-XL Nav Management System.

These interfaces consist of three major capabilities:

1. Access to ground based Global Data Center computers from a Personal Computer for the purpose of generating or retrieving performance optimized flight plans and current aviation weather;

2. Digital transfer of AFIS Flight Plan and weather data into the Nav Management System for display and performance monitoring on the GNS-XL Color CDU; and

3. Air/ground computer link interfacing the GNS-XL Nav Management System to the ground based Global Data Center computers for the purpose of providing enroute flight plan, weather, performance updates, requesting pre-departure clearance, and sending or receiving messages.

AFIS interfaces with ARINC, SITA and AVICOM VHF networks and the Inmarsat satellite network to provide a communication link between the aircraft and the Global Data Center. ARINC provides coverage within the continental United States, Hawaii, Alaska, the Aleutians, Guam, Saipan, Mexico, Puerto Rico, and parts of Canada; SITA covers Europe, the South Pacific, Southeast Asia, the Caribbean, and South and Central America and AVICOM covers Japan. In most areas while using the VHF networks, data link coverage is excellent above Flight Level 200, but deteriorates below this flight level. Satellite data link coverage is excellent both on the ground and in-flight between 70° North and 70° South.

Many variables, including the amount of processing time and the length of the message, effect the turnaround time for information. Depending on the nature of the update request, the pilot should expect a turnaround time of approximately five minutes when using the VHF network and twelve minutes when using the satellite network.

AFIS consists of the following components: Global Data Center (GDC), Data Transfer Unit (DTU), Data Management Unit (DMU), and Antenna Switching Unit (ASU).

GLOBAL DATA CENTER (GDC)

The Global Data Center (GDC) is a ground based computer facility built and operated by Honeywell for the purpose of providing flight planning, aviation weather, and message forwarding services to AFIS operators on a subscription basis. The GDC communicates with the operator via data quality telephone lines to a Personal Computer as well as through the ACARS and satellite networks directly to the aircraft in flight.

DATA TRANSFER UNIT (DTU)

The Data Transfer Unit (DTU) is a 3.5 inch micro floppy disk drive mounted in the cockpit. Once the GNS-XL is switched on and the disk inserted in the DTU, the AFIS Flight Plan and weather data are transferred to and stored in the Data Management Unit.

DATA MANAGEMENT UNIT (DMU)

The Data Management Unit (DMU) computer formats the disk information and presents it to the GNS-XL for display on the CDU.

The DMU also incorporates a data quality VHF transceiver. This radio is tuned automatically by the DMU computer to the appropriate ground station for the purpose of transmitting data to and receiving data from the Global Data Center while in flight.

ANTENNA SWITCHING UNIT (ASU)

The Antenna Switching Unit (ASU) is required for those installations where the DMU transceiver shares an existing VHF communications antenna. The ASU switches the transmit side of the antenna between the DMU data transmitter and the VHF voice transmitter.

During power up, the ASU defaults to the voice transmitter, if AFIS is configured for a shared antenna. Pressing the AFIS annunciator on the instrument panel switches the transmit side of the antenna to the DMU data transmitter. Pressing the annunciator again, or pressing the "push to talk" button on the VHF communications radio switches the transmit side of the antenna back to the voice transmitter.

If AFIS is configured for non-shared antenna or there is no configuration module, during power up the system will assume an antenna is dedicated to AFIS.

The Satellite Data Communications System consists of the following components: Satellite Communications Unit (SCU), High Power Amplifier/ Low Noise Amplifier (HPA/LNA), and Satellite Antenna.

SATELLITE COMMUNICATIONS UNIT (SCU)

The Satellite Communications Unit (SCU) incorporates the satellite transceiver and instruction for transmitting to and receiving data from the satellite network. The SCU also contains information to allow it to tune the appropriate satellite operating region automatically and to the appropriate ground stations.

HIGH POWER AMPLIFIER/ LOW NOISE AMPLIFIER (HPA/LNA)

The High Power Amplifier/ Low Noise Amplifier (HPA/LNA) amplifies transmitted and received information while minimizing noise.

SATELLITE ANTENNA

The antenna is designed to meet the Inmarsat system specification.

PAGE DISPLAY DEFINITIONS

AFIS FLIGHT PLAN LIST PAGE

If the GNS-XL is configured for AFIS, this page appears directly after the Initialization Page. The DTU reads the inserted disk and displays one of the following messages:

NO AFIS FLT PLANS ON DISK: There are no AFIS Flight Plans stored on the disk. (Figure 7-1)

NO DISK: Either no disk was inserted into the DTU prior to power up or the DTU cannot read the disk.

READING DISK: The DTU is transferring data from the disk to the DMU.



Figure 7-1

AIRCRAFT TYPE: The Global designated aircraft type as transferred from the disk or obtained by an Update or Recall procedure.

*NOTE: Once the system is initialized, the page appears between the Active Flight Plan Page and the first GNS-XL **FLIGHT PLAN LIST** Page.*

AFIS FLT PLAN LIST: A list of AFIS generated Flight Plan origin/destination identifiers with date of issue. (Figure 7-2)

*NOTE: Additional pages can be accessed when more than 6 Flight Plans are listed by DEPRESSING the **FPL** Key to access page.*

LOADING FLIGHT PLAN: The system is loading a selected AFIS Flight Plan.



Figure 7-2

REPLACE ACTIVE FPL?: Allows a selected AFIS Flight Plan to replace an existing Active Flight Plan.

UPDA-XXXX: (Where XXXX is an ident) Indicates a Flight Plan Update for an active Flight Plan has occurred.

FLIGHT PLAN PROGRESS (NAVIGATION PAGE 5)

HEC:KVNY: Current FROM and TO waypoints. (Figure 7-3) The FROM waypoint can be replaced by **DIR TO** for DIRECT TO.

FL: AFIS planned flight level for leg being flown.

NOTE: Field is dashes when aircraft is projected to be climbing or descending.

PLAN: Planned

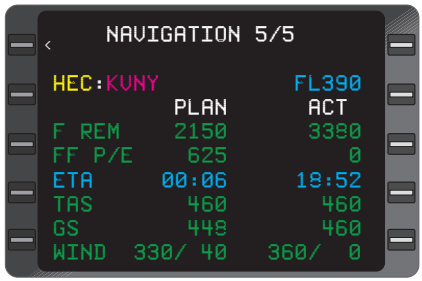


Figure 7-3

This column is AFIS planned data either transferred from the disk or received via the data link.

NOTE: Planned fields become dashes when no planned data is available for the current leg.

(Figure 7-4).

ACT: Actual

This column is GNS-XL data.

NOTE: Actual fields become dashes when cursor is positioned over the leg identifiers.

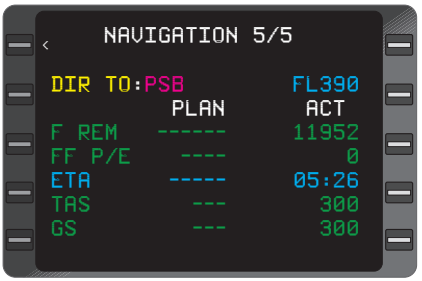


Figure 7-4

(Figure 7-5).

F REM: Fuel Remaining

Planned: AFIS planned fuel remaining at aircraft present position based on DMU interpolated values.

Actual: The total fuel on board as calculated by the GNS-XL.

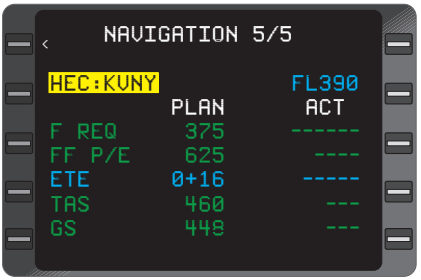


Figure 7-5

*NOTE: Field changes to **F REQ** when cursor is positioned over the leg identifiers*

F REQ: Fuel Required

Planned: The AFIS planned fuel required to fly the leg displayed.

FF P/E: Fuel Flow per Engine

Planned: AFIS planned fuel flow per engine for leg displayed.

Actual: Total actual fuel flow divided by the number of engines. This is an averaged quantity.

ETA: Estimated Time of Arrival

Planned: The sum of the AFIS planned time enroute for the leg displayed and the actual time of arrival over the previous waypoint.

Actual: The estimated time of arrival over TO waypoint based on current groundspeed.

*NOTE: Field changes to **ETE** when cursor is positioned over the leg identifiers. (Figure 7-6)*

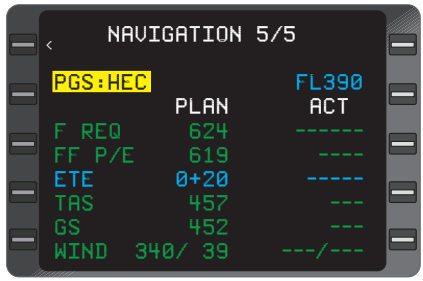


Figure 7-6

ETE: Estimated Time Enroute

Planned: The AFIS planned time enroute for leg displayed.

TAS: True Airspeed

Planned: AFIS planned true airspeed for leg displayed.

Actual: Actual true airspeed of aircraft. The **TAS** value shown is the same as on **NAVIGATION** Page 3.

GS: Groundspeed

Planned: AFIS planned groundspeed for leg displayed.

Actual: Actual groundspeed of the aircraft as calculated by the GNS-XL. The **GS** value shown is the same as on **NAVIGATION** Page 1.

WIND:

Planned: AFIS forecast wind for leg displayed. Direction is displayed relative to True North with velocity in knots.

Actual: Actual wind for leg as computed by the system. Direction is displayed relative to True North with velocity in knots.

AFIS MENU PAGE

AFIS FLT PLAN: Review of the AFIS Flight Plan displaying:

- Fuel and time requirements
- Weights, flight level, and route
- Operator inputs used in generating Flight Plan
- Performance bias entered by operator



Figure 7-7

SIGMETS: Review of all SIG-

METS(SIGnificant METeorology) transferred via the disk and/or received via the data link.

TERMINAL WX: Review of all Terminal Weather transferred via the disk and/or received via the data link. Additional requests can be entered.

WINDS ALOFT: Review of all Winds Aloft identifiers transferred via the disk and/or received via the data link. Additional requests can be entered.

RECALL AFIS FPL: Allows operator to recall a previously accessed flight plan and associated weather from the Global Data Center via the data link.

SEND AFIS MSG: Allows operator to send non-flight related text messages via the satellite data link and flight related text messages via the satellite or VHF data link.

DISPL AFIS MSG: Allows operator to display flight related messages received via the data link.

OPERATING MODES: Allows operator to select operating mode for:

- AUTO REPORT
- AUTO WX UPDT
- VHF NETWORK (ARINC, SITA/AVICOM) and if applicable,
- SAT (satellite) NETWORK.
- PRINTER CTRL

AFIS FLT PLAN PAGES

The AFIS Flight Plan Pages are accessed by selecting Option 1 on the **AFIS MENU** Page.

AFIS FLT PLAN PAGE 1

FUEL AND TIME REQUIREMENTS

FR: The origin airport identifier. (Figure 7-8) When there is an enroute update to the flight plan, the identifier will change to **UPDATE**.

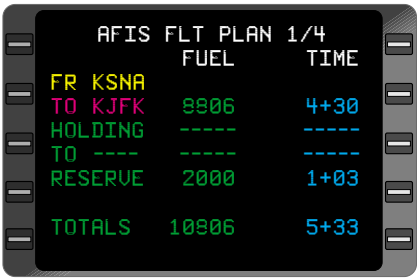


Figure 7-8

UPDATE refers to the Lat/Lon position of aircraft at time of last update request. (Figure 7-9).

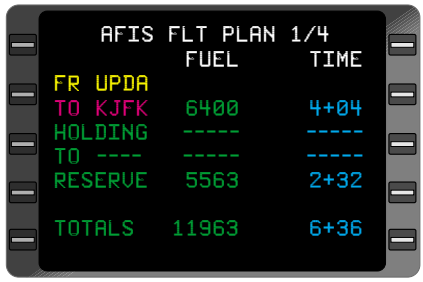


Figure 7-9

TO: The TO waypoint identifier.

TO/FUEL: Projected fuel required from FROM waypoint to TO waypoint as transferred from disk or updated enroute via the data link.

TO/TIME: The estimated time enroute in hours and minutes from the FROM waypoint to the TO waypoint as transferred from the disk or updated through the data link.

HOLDING/FUEL: Projected fuel required for Holding Time as transferred from disk or received via the data link.

HOLDING/TIME: The holding time in hours and minutes as transferred from disk or received via the data link.

TO/FUEL: Projected fuel required from TO waypoint to alternate airport as transferred from disk or received via the data link.

TO/TIME: The estimated time enroute in hours and minutes from TO waypoint to alternate airport as transferred from disk or received via the data link.

RESERVE FUEL: Projected reserve fuel at TO waypoint as transferred from the disk or received via the data link.

RESERVE TIME: Projected flight time remaining at TO waypoint to consume the displayed **RESERVE FUEL**.

TOTALS: Sum of planned enroute and reserve fuel and sum of planned enroute and reserve time.

AFIS FLT PLAN PAGE 2

WEIGHTS, FLIGHT LEVEL AND ROUTE

RAMP WT: Planned ramp weight in lbs prior to starting engines as transferred from disk or received via the data link. (Figure 7-10)

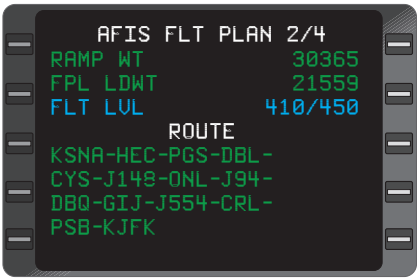


Figure 7-10

GROSS WT: Sum of basic operating weight, payload, and fuel remaining as calculated by GNS-XL. (Figure 7-11)

*NOTE: **RAMP WT** changes to **GROSS WT** if there is an automatic **FUEL FLOW** input, FUEL REMAINING quantity, and input for basic operating weight and **PAYLOAD** input.*

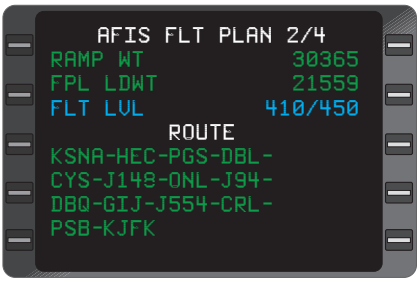


Figure 7-11

FPL LDWT: Flight planned landing weight of aircraft at destination as transferred from disk or received via the data link.

FLT LVL: Planned flight level(s) as transferred from disk or received via the data link.

ROUTE: Planned route of flight as computed by Global Data Center and transferred from disk or received via the data link.

*NOTE: Pressing the **AFIS** or **NXT** Key displays the remainder of the route (up to 50 waypoints).*

UPDATE: Waypoint identifier defining position of aircraft at time of last update request.

AFIS FLT PLAN PAGE 3

OPERATOR INPUTS

FROM: Origin airport identifier as transferred from disk or received via the data link, or UPDATE waypoint defining position of aircraft at time of last update request. (Figure 7-12)

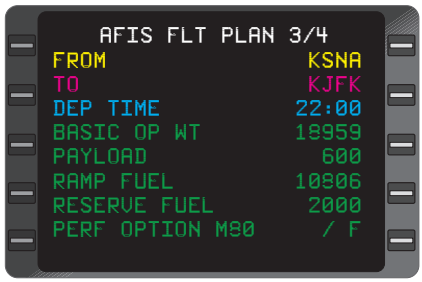


Figure 7-12

TO: Destination waypoint transferred from disk or received via the data link.

DEP TIME: Estimated time of departure in GMT. This field changes to **UPDATE TIME** when a flight plan is updated and indicates time of issued update. (Figure 7-13)

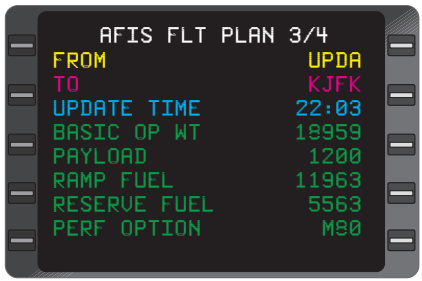


Figure 7-13

BASIC OP WT: AFIS planned basic operating weight as transferred from disk or received via the data link.

PAYLOAD: AFIS planned payload weight as transferred from disk or received via data link.

RAMP FUEL: AFIS planned total trip fuel as transferred from disk or received via data link. This field changes to **UPDATE FUEL** when a flight plan is updated and refers to the actual fuel remaining at time of last update request.

FPL RES FUEL: AFIS planned reserve fuel remaining at destination as transferred from disk or received via the data link. This field changes to **RESERVE FUEL** when a flight plan is updated and refers to the updated estimate of fuel remaining at destination.

PERF OPTION: AFIS planned cruise mode as transferred from disk or received via the data link. Alternate cruise mode options may be requested and updated via the data link.

AFIS FLT PLAN PAGE 4

PERFORMANCE BIAS

This page allows a review of the operator entered performance bias data transferred from disk or received via the data link. (Figure 7-14)

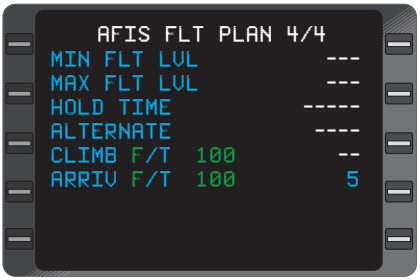


Figure 7-14

SIGMETS PAGES

AFIS SIGMETS pages are accessed by selecting Option 2 on the **AFIS MENU** Page.

This page allows a review of all SIGMETS transferred from disk or received via the airborne data link. SIGMETS may consist of one or more pages of text and display their FAA code names followed by text.

DATE: Issue date of SIGMET. This field may be blank if transferred from disk.

NOTE: Date field will remain blank if no date is supplied on disk or by UPDATE.



Figure 7-15

FR: Desired start VOR, airport, waypoint, Lat/Lon, VORTAC ident, or NAT (North Atlantic Tracks). (Figure 7-15 or 7-16)

NOTE: Parentheses remain until a SIGMET update is received via the data link.

TO: Desired end VOR, airport, waypoint, Lat/Lon or VORTAC ident. No entry is required if **FR** is **NAT**.

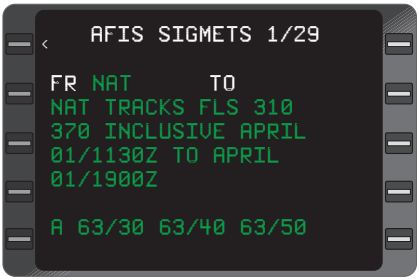


Figure 7-16

TRANSMIT REQUEST?: When cursor is on this field and **ENT** is pressed, a SIGMET update request is sent to the Global Data Center via data link. **DATA LINK DISABLED** will appear if the data link is disabled and the request will not be transmitted.

*NOTE: This field only appears when the **FR** or **TO** fields are in parentheses.*

If no SIGMETS are on disk, the message **NO SIGMETS ON DISK** appears. If there are no SIGMETS via a Flight Plan update the message reads **NO SIGMETS**.

(Figure 7-17)



Figure 7-17

TERMINAL WEATHER PAGES

The **TERMINAL WEATHER** Menu Page is accessed by selecting Option 3 on the **AFIS MENU** Page.

Terminal identifiers for which associated weather data is available to review are listed. The identifiers in parentheses represent pilot entered requests for additional weather not stored in the DMU. The parentheses disappear when weather updates have been received via the data link.

TRANSMIT REQUEST?: When cursor is on this field and **ENT** is pressed, a weather update request is sent to the Global Data Center via data link. (Figure 7-18)

DATA LINK DISABLED: Aircraft equipped with the Antenna Switching Unit must DEPRESS momentary AFIS annunciator to enable the air to ground data link. VHF or satellite network must also be enabled.



Figure 7-18

TERMINAL WX DATA PAGES

These pages are accessed by selecting a terminal weather identifier on the **TERMINAL WEATHER** Menu Page.

They allow review of Terminal Weather by identifier as transferred from disk or received by the Global Data Center via the data link.

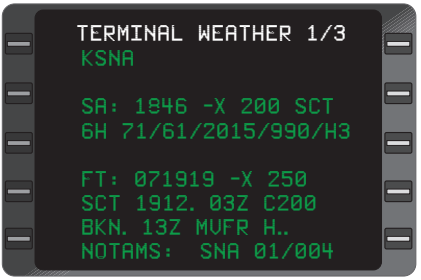


Figure 7-19

DATE: Issue date of actual weather. This field may be blank if transferred from disk.

Weather available for review includes:

- **SA** (Sequence Reports)
- **FT** (Terminal Forecasts)
- **NOTAMS** (Notices to Airmen)
- **PIREPS** (Pilot Reports)

WINDS ALOFT PAGES

The **AFIS WINDS ALOFT** Menu Page is accessed by selecting Option 4 on the AFIS MENU Page.

The WIND identifiers represent VOR, airport, waypoint, Lat/Lon or VORTAC locations, for which associated weather data is available.

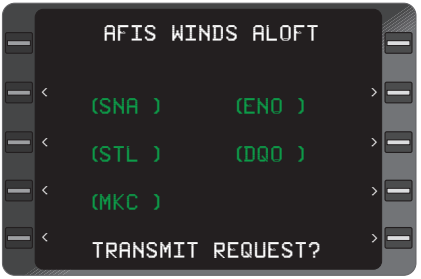


Figure 7-20

WINDS ALOFT DATA PAGES

These pages are accessed by selecting a wind identifier on the **WINDS ALOFT MENU** page.

They allow review of Winds Aloft data by VOR, airport, waypoint, Lat/Lon or VORTAC identifier as transferred from disk or received via the data link.

DATE/TIME: Actual day and time of the issue of the wind information. This field may be blank if transferred from disk. The number is read 12th day 2356 ZULU. (Figure 7-21)

Wind data available to review includes:

- Flight Level
- Wind Direction (True North)
- Wind Velocity (Knots)
- Temperature (Degrees Celsius)

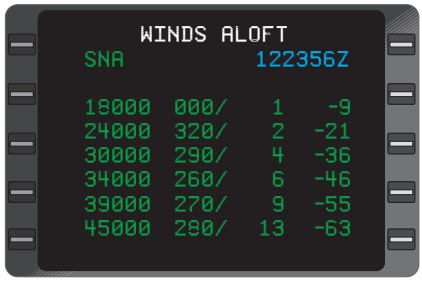


Figure 7-21

RECALL AFIS FPL PAGE

This page is accessed by selecting Option 5 on the **AFIS MENU** Page.

This page allows the pilot to recall previously computed AFIS Flight Plan and Weather requests from the Global Data Center via the data link.

FPL-#: A Global Data Center generated Flight Plan number. Entered as an alpha character followed by four numeric digits. If **FPL#** is entered, other entries are not required. (Figure 7-22)



Figure 7-22

DATE: Issue date of recalled AFIS Flight Plan.

ETD: Estimated time of departure in GMT of recalled AFIS Flight Plan .

FR: Origin of recalled AFIS Flight Plan.

TO: Destination of recalled AFIS Flight Plan. (Figure 7-23)

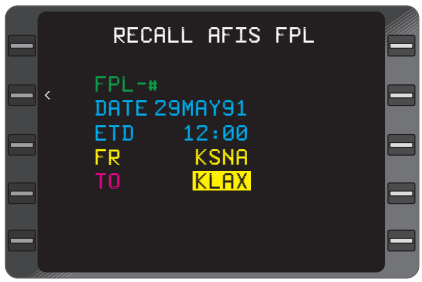


Figure 7-23

TRANSMIT REQUEST?: When cursor is on this field and **ENT** is pressed, the recall request is sent to the Global Data Center via data link. (Figure 7-22)

DATA LINK DISABLED: Aircraft equipped with the Antenna Switching Unit, must DEPRESS momentary AFIS annunciator to enable the air to ground data link. VHF or satellite network must also be enabled.

SEND AFIS MESSAGE PAGE

This page is accessed by selecting Option 6 on the AFIS MENU Page.

↑ ↓ indicate that pressing the Line Select Key adjacent the arrow will move the cursor in the direction of the arrow.

PPM: Preprogrammed messages that can be stored in non-volatile memory, selected and sent without being re-entered.

TO: Receiver of message.

FROM: Sender's identification (name or tail number).

#: Receiver's address. See Table A-1 for possible address variations and the method in which the Global Data Center processes the message.

MESSAGE TEXT: Fifteen lines of text entry available. Text must be flight related when using the VHF network operating mode.

SEND MESSAGE: When cursor is over this field and **ENT** is pressed the message is sent via the data link. (Figure 7-24)

DATA LINK DISABLED: Aircraft equipped with the Antenna Switching Unit, must DEPRESS momentary AFIS annunciator to enable the air to ground data link. VHF or satellite network must also be enabled.



Figure 7-24

Phone number • GDC will deliver message verbally to given number.	#206 869 6450
AFIS-equipped aircraft • GDC will deliver message to aircraft specified.	#N4322B
"A" followed by phone number • GDC will deliver message to PC at given number.	#A206 869 6458
"AI" followed by Country Code, City Code, and phone number • GDC will deliver message to PC located outside the US or Canada.	#AI4118106530
"F" followed by phone number • GDC will deliver message to FAX machine at given number	#F206 869 6464
"FI" followed by Country Code, City Code and phone number • GDC will deliver message FAX machine located outside the US or Canada.	#FI4118108708
"A" followed by ARINC or SITA address • GDC will deliver message to ARINC or SITA address given.	#AHDQGLXH
Auto Forward Code • GDC will deliver message to PC, FAX, or ARINC/SITA as defined in GDC database.	#GWSOPS
GDC Code • GDC will search database for phone number and special contact name or message associated with code and deliver message verbally.	#GWSPJC
ADCUS XXX • GDC will search database for customs phone number at specified airport and deliver message verbally.	#ADCUS TEB
PDC XXX • GDC will search database for pre-departure clearance and forward to aircraft if found.	#PDC LAX
Global Defined Codes	
• BASEOPS International	#BASEOPS or #BOPS
• Air Routing International	#ARC
• Universal Weather	#UNIVERSAL or #UV or #UVAIR
• Jeppesen Data Plan	#JETPLAN or #DATAPLAN or #JEPPESEN
• Medlink	#MEDLINK
GDC • Message will be printed at GDC further action.	#GDC

AFIS Addresses
Table 1

PPM MENU PAGE (PREPROGRAMMED MESSAGES)

This page is accessed from the **SEND MESSAGE** Page by selecting **PPM** in the upper right hand corner.

PPM can only be selected when an entry has been made in the **TO** or # fields on the **SEND MESSAGE** Page. The **TO**, **FROM**, and # data are used when sending a preprogrammed message.

Titles for up to six preprogrammed messages can be listed for selection to review, change, and send.

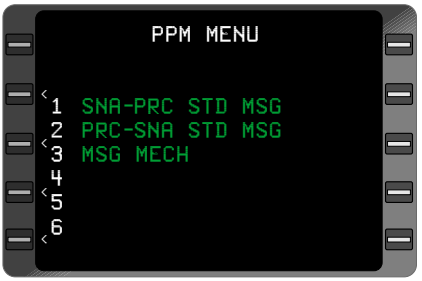


Figure 7-25

PREPROGRAMMED MESSAGE PAGES

These pages display the message text for each preprogrammed message title selected from the **PPM MENU** Page. Up to seven lines of text may be entered. Preprogrammed Messages will remain in non-volatile memory and can be removed by editing the title on the **PREPROGRAMMED MSG** Menu Page.



Figure 7-26

DISPLAY AFIS MSG PAGE

The message page is displayed by selecting Option 7 on the **AFIS MENU** Page.



Figure 7-27

All text messages sent to the tail number of the aircraft being flown appear in this section. Up to 15 pages of text can be stored according to time received, with the newest message appearing first. Messages can originate from:

- Another AFIS equipped aircraft,
- third party, or
- Global Data Center.

OPERATING MODES PAGE (FOR AFIS USERS EQUIPPED WITH SATELLITE DATA COMMUNICATIONS SYSTEM)

Operating modes information is accessed by selecting option 8 on the **AFIS MENU** Page.

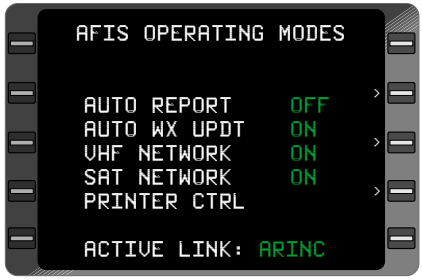


Figure 7-28

AUTO REPORT:

ON: The aircraft will automatically report position and station ID for weather updates to the Global Data Center via the data link on a timed basis.

OFF: The automatic reporting capability has been manually inhibited by the pilot.

AUTO WX UPDT (WEATHER UPDATE):

ON: The Global Data Center will automatically send weather/wind updates for the displayed idents when new information is issued.

OFF: The auto weather update function is not enabled.

VHF NETWORK:

Ground networks that AFIS interfaces with to establish a data link with the Global Data Center.

ON: The appropriate VHF network will automatically be selected whenever the aircraft present position is within the specified boundaries. (Figure 7-28)

OFF: Network is not enabled.

SAT NETWORK:

Satellite network that AFIS interfaces with to establish a data link with the Global Data Center.

ON: The appropriate satellite region will automatically be selected whenever the aircraft present position is within the specified boundaries.

OFF: Network is not enabled.

PRINTER CTRL:

Allows access to the Printer Control Page.

ACTIVE LINK:

Indicates the network in service, i.e. **ARINC**, **SITA** or **SATCOM**. (Figure 7-29)

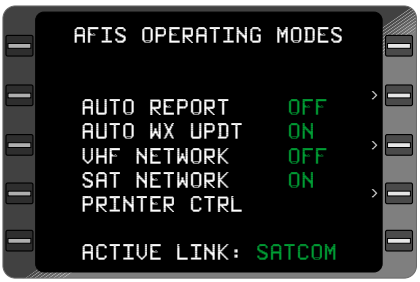


Figure 7-29

NONE: All networks are turned OFF or current position does not correspond with the manually selected boundaries.

*NOTE: The VHF network has precedence over the satellite network in areas of shared coverage and must be turned **OFF** in order for **SATCOM** to be the Active Link. **AUTO REPORT**, **AUTO WX UPDT** and **OPERATING MODE** selection status are stored in non-volatile memory. If the operator turns to **OFF** the operator must reselect to turn **ON.***

VHF LINK CONTROL PAGE

This page is accessed when the VHF Network is turned **ON**.

ARINC, SITA/AVICOM: Ground networks that AFIS interfaces with to establish a data link with the Global Data Center.

AUTO: The VHF network will automatically be selected whenever the aircraft present position is within the appropriate boundaries. (Figure 7-30)

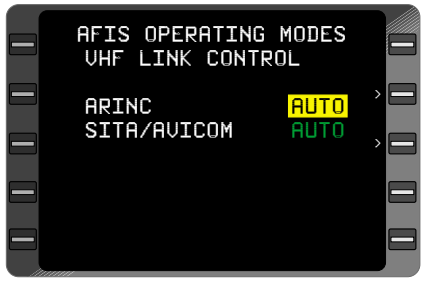


Figure 7-30

MAN (manual): The desired network will be maintained independent of the present position. In manual, the system will only allow transmission when present position is within the appropriate boundaries. All other networks will be turned **OFF** if one is in **MAN**.

OFF: Network is not enabled.

SAT LINK CONTROL PAGE

This page is accessed when the SAT Network is turned **ON**.

SAT COMM:

AUTO: The satellite network will automatically be selected whenever the aircraft present position is within the appropriate boundaries and VHF Network is turned **OFF** or is not in VHF coverage.

MAN (manual): The desired region will be maintained independent of the present position. In manual, the system will only allow transmission when present position is within the appropriate boundaries and VHF network is turned **OFF** or is not in VHF coverage.

OFF: Network is not enabled.

REGION: The four satellite regions, West Atlantic, East Atlantic, Pacific Ocean and Indian Ocean, that AFIS interfaces with to establish a data link with the Global Data Center. (Figure 7-31)

LINK:

OPERATIONAL: Message indicating the SAT COMM link is enabled.



Figure 7-31

NONE: Current position does not correspond with the manually selected boundaries or satellite link is not operational.

ACTIVATE?: Use to enable satellite network in **AUTO** or **MAN**. (Figure 7-32)



Figure 7-32

OPERATING MODES PAGE (FOR AFIS USERS NOT EQUIPPED WITH SATELLITE DATA COMMUNICATIONS SYSTEM)

Operating Modes information is accessed by selecting Option 8 on the **AFIS MENU** Page.

AUTO REPORT:

ON: The aircraft will automatically report position and station ID for weather updates to the Global Data Center via the data link on a timed basis.

OFF: The automatic reporting capability has been manually inhibited by the pilot.

AUTO WX UPDT (WEATHER UPDATE):

ON: The Global Data Center will automatically send weather/wind updates for the displayed idents when new information is issued.

OFF: The auto weather update function is not enabled.

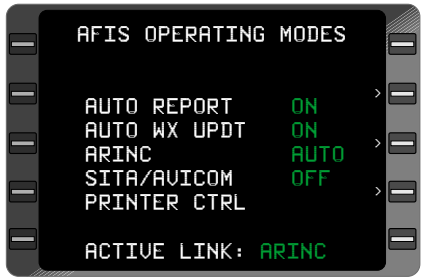


Figure 7-33

ARINC, SITA, AVICOM:

Ground networks that AFIS interfaces with to establish a data link with the Global Data Center.

AUTO: The desired network will automatically be selected whenever the aircraft present position is within the appropriate boundaries.

MAN (manual): The desired network will be maintained independent of the present position. In manual, the system will only allow transmission when present position is within the appropriate boundaries.

OFF: Network is not enabled.

*NOTE: If a ground network is placed in manual mode, all others will go to **OFF**.*

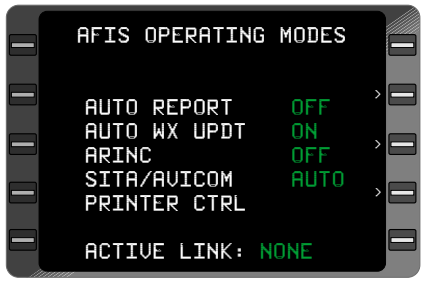


Figure 7-34

PRINTER CTRL:

Allows access to the Printer Control Page.

ACTIVE LINK:

Indicates the network in service, i.e. **ARINC**, **SITA**, **AVICOM**, or **AIR CA** (Air Canada).

NONE: All networks are turned **OFF** or current position does not correspond with the selected mode.

*NOTE: **AUTO REPORT**, **AUTO WX UPDT** and **OPERATING MODE** selection status are stored in non-volatile memory. If the operator turns to **OFF** or **MAN**, the operator must reselect to turn **ON**.*

ACTIVE FLIGHT PLAN PAGE (FOR AFIS FLIGHT PLAN UPDATING)

AFIS UPDATE: Allows pilot to:

- Amend an existing AFIS Flight Plan
- Update SIGMETS
- Request a new AFIS Flight Plan



Figure 7-35

AFIS UPDATE VERIFICATION PAGE

ACTUAL FL: Actual flight level of aircraft rounded to nearest 100 ft. as entered by the pilot.

ASSIGNED FL: Current Flight Level assigned by ATC as verified or amended by the pilot.

PAYLOAD: Current aircraft payload verified or amended by the pilot.

FUEL REM: Actual fuel remaining as calculated by the GNS-XL or amended by the pilot.

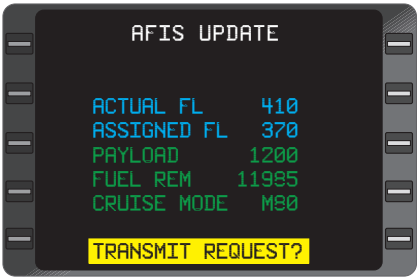


Figure 7-36

CRUISE MODE: Current aircraft Cruise Mode as verified or amended by the pilot.

TRANSMIT REQUEST: When cursor is over this field and **ENT** is pressed, the update request is sent via the data link. (Figure 7-36)

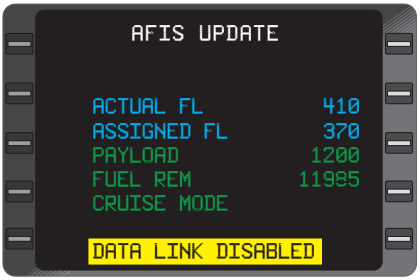


Figure 7-37

DATA LINK DISABLED: Aircraft equipped with the Antenna Switching Unit, must DEPRESS momentary AFIS annunciator to enable the air to ground data link. VHF or satellite network must also be enabled.

SYSTEM MESSAGES PAGE

AFIS related messages appear on the **SYSTEM MESSAGES** Page (see Section 2 of the Operators Manual). When new messages are added, the **MSG** Key will flash and a flashing asterisk will appear next to the new message.



Figure 7-38

SYSTEM MESSAGES

ADVISORY:

The following are the advisory messages which pertain to AFIS and may appear on the GNS-XL **SYSTEM MESSAGES** Page.

SYSTEM MESSAGE EXPLANATION

WX UPDATED The DMU has received an AFIS terminal weather update from the Global Data Center.

WINDS UPDATED The DMU has received an AFIS Winds Aloft update from the Global Data Center.

SIGMETS UPDATED The DMU has received an AFIS SIGMETS update from the Global Data Center.

FPL UPDATED The DMU has received an AFIS Flight Plan update from the Global Data Center.

1 **NO COMM** AFIS update request initiated by the pilot has not been acknowledged by the ground communications network.

DOWNLINK FAIL The last AFIS downlink request contained an invalid character and was not transmitted to the ground network.

UPLINK FAIL The last AFIS uplink attempt by the ground network was not accepted by the DMU.

FPL RECALLED The DMU has received a previously accessed AFIS Flight Plan from the Global Data Center.

DATA CENT AK Global Data Center has acknowledged a downlink request.

AFIS CONFIG CHG. Configuration information in the DMU has been changed to agree with interfaced configuration module

AFIS CONFIG FAIL Configuration module has failed. DMU non-volatile memory configuration information will be used.

AFIS CONFIG LOST DMU non-volatile memory has lost its configuration information and the configuration module has failed.

NOTE: Message may not cause MSG Annunciator to flash.

ACTION REQUIRED:

The following are the action required messages which pertain to AFIS and may appear on the GNS-XL **SYSTEM MESSAGES** Page.

SEE AFIS MSG There is a text message on the **AFIS MESSAGES** page which requires acknowledgement and possibly pilot action.

THIS PAGE INTENTIONALLY LEFT BLANK

SYSTEM OPERATION

PRE-DEPARTURE

AFIS FLIGHT PLAN SELECTION

The **AFIS FLIGHT PLAN LIST** Page appears after the Initialization Page. The page also appears between the Active Flight Plan Page and the first GNS-XL **FLIGHT PLAN LIST** Page.

NOTE: For aircraft equipped with the Antenna Switching Unit, DEPRESS momentary AFIS annunciator to enable the air to ground data link.

TO ENTER AN AFIS FLIGHT PLAN

1. Preprogrammed AFIS Disk - INSERT disk into DTU.
2. Select **AFIS FLIGHT PLAN LIST** Page using either (a) or (b).

 a. Initialization Page - Enter Date, GMT, and Initial Position. **AFIS FLIGHT PLAN LIST** Page appears.

 b. **FPL** Key - DEPRESS until desired **AFIS FLIGHT PLAN LIST** Page appears. (Figure 7-39)



Figure 7-39

NOTE: Desired flight plan may be found on a subsequent page if more than six flight plans have been either transferred from the disk or received via the data link. If there is more than one Flight Plan with the same Departure/ Destination pair a random letter will be displayed between the Depart?Dest pair and the date. This letter and the date distinguish one FPL from the other.

3. Line Select Key - DEPRESS to place cursor over desired Flight Plan. (Figure 7-40)



Figure 7-40

4. FPL Date - VERIFY.

5. **ENT** Key - DEPRESS.

*NOTE: If an Active Flight Plan exists, the message **REPLACE ACTIVE FPL?** appears. DEPRESS **ENTER** to replace the Active Flight Plan with the AFIS Flight Plan.*

6. ACTIVE FPL - CONFIRM. AFIS Flight Plan becomes the Active Flight Plan. The initial leg must be established on the NAV Page so the system can navigate normally.

ENROUTE

REVIEWING FLIGHT PLAN PROGRESS

1. **NAV** Key - DEPRESS until **NAVIGATION** Page 5, Flight Plan Progress Page appears. (Figure 7-41)

2. Current Leg Data - CONFIRM. Observe AFIS Planned data vs. Actual GNS-XL calculated data.



Figure 7-41

REVIEWING AFIS PLANNED LEG DATA

3. Line Select Key - DEPRESS to position cursor over Leg Identifiers. (Figure 7-42)

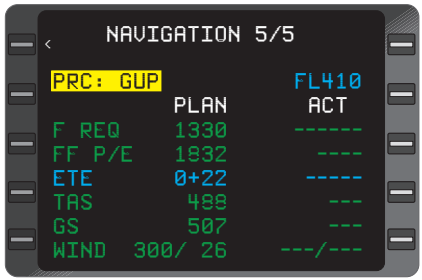


Figure 7-42

*NOTE: ACTUAL data fields become dashes, **F REM** field becomes **F REQ** and **ETA** field becomes **ETE**.*

4. **ENT** Key - DEPRESS to review Planned data for future legs of the Active AFIS Flight Plan.

5. **BACK** or **PRV** Key - DEPRESS to review Planned data for previous

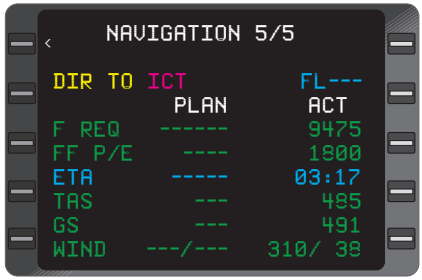


Figure 7-43

legs of the AFIS Flight Plan.

6. Line Select Key - DEPRESS to remove cursor from page and return to Current Leg Progress.

*NOTE: If the current leg displayed does not agree with a planned AFIS leg, the **PLAN** fields display dashes. (Figure 7-43) If AFIS Flight Plan is updated via the data link, new values will appear. Refer to Updating AFIS Flight Plan for update procedure.*

REVIEWING AFIS FLIGHT PLAN DATA

1. **AFIS** Key - DEPRESS to display **AFIS MENU** Page.
2. Line Select Key - Place cursor over menu Option 1, **AFIS FLT PLAN**. (Figure 7-44)
3. **ENT** Key - DEPRESS.



Figure 7-44

AFIS FLIGHT PLAN PAGE 1

4. REVIEW fuel and time data. (Figure 7-45) If the Flight Plan has been updated, the **FROM** identifier (origin airport) will be changed to **UPDATE**. (Figure 7-46)

Fuel and time data change as a result of the updated information. The **TOTALS** reflect the changes in the **TO** and **RESERVE** fields.

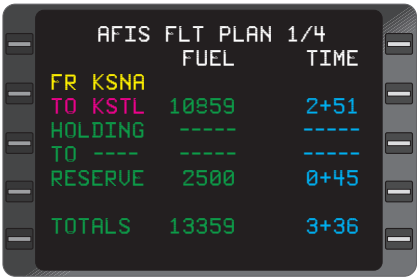


Figure 7-45

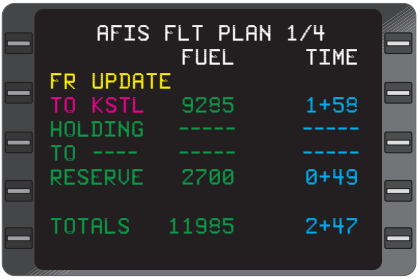


Figure 7-46

5. **AFIS** or **NXT** Key - DEPRESS to display AFIS Flight Plan Page 2.

*NOTE: Pressing the **PRV** or **BACK** Key will re-display the **AFIS MENU** Page with the cursor positioned over Option 1.*

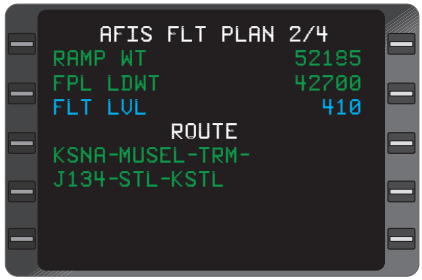


Figure 7-47

AFIS FLIGHT PLAN PAGE 2

6. WEIGHTS, FLIGHT LEVEL and ROUTE - REVIEW (Figure 7-47). If the Flight Plan has been updated, the first route identifier will be **UPDATE**, followed by the updated route to destination. **FPL LDWT** and **FLT LVL** values may change as data is updated.

*NOTE: If Automatic Fuel Flow is interfaced to the GNS-XL, **RAMP WT** changes to **GROSS WT** after the engines are started and the **GROSS WT** value field decreases on a periodic basis as the GNS-XL recalculates. (Figure 7-48)*

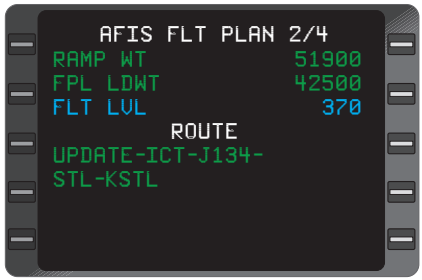


Figure 7-48

7. **AFIS** or **NXT** Key - DEPRESS. Subsequent pages of the Route will appear as needed (up to 50 waypoints) or **AFIS FLT PLAN** Page 3 appears.

*NOTE: DEPRESSING **PRV** or **BACK** Key will display **AFIS FLT PLAN** Page 1.*

AFIS FLIGHT PLAN PAGE 3

8. Pilot Inputs - REVIEW. (Figure 7-49)

*NOTE: If there has been an update to the flight plan: **FROM** identifier (origin airport) changes to **UPDATE**; **DEP TIME** changes to **UPDATE TIME**; **RAMP FUEL** changes to **UPDATE FUEL**; **FPL RES FUEL** changes to **RESERVE FUEL**; and the values in the respective fields change to reflect the updated information. (Figure 7-50)*

9. **AFIS** or **NXT** Key - DEPRESS to display **AFIS FLT PLAN** Page 4.

*NOTE: DEPRESSING **PRV** or **BACK** Key will display **AFIS FLT PLAN** Page 3.*

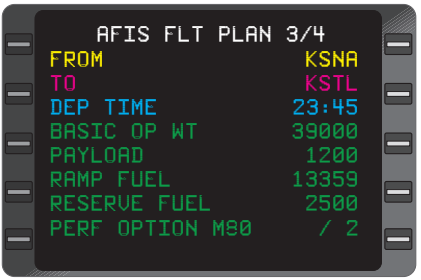


Figure 7-49

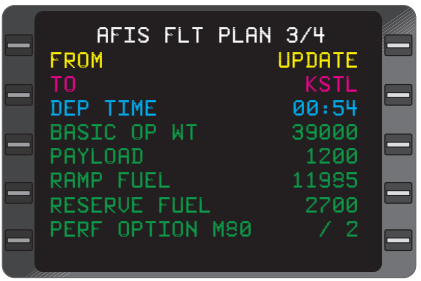


Figure 7-50

AFIS FLIGHT PLAN PAGE 4

10. Performance Bias Data - REVIEW. (Figure 7-51)

11. **AFIS** or **NXT** Key - DEPRESS to return to **AFIS MENU** Page, where the cursor will be positioned over Option 2.

*NOTE: Pressing the **BACK** or **PRV** Key throughout the Flight Plan Pages will cause the previous Flight Plan Page to appear.*

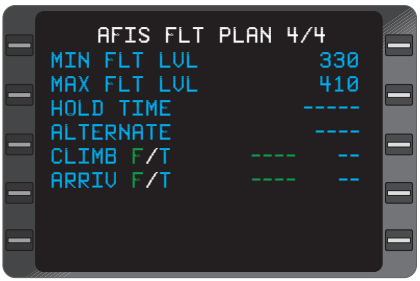


Figure 7-51

SIGMETS REVIEW/UPDATE

1. **AFIS** Key - DEPRESS to display **AFIS MENU** Page.
2. Line Select Key - DEPRESS to position cursor over Option 2, **SIGMETS**.
3. **ENT** Key - DEPRESS to display first **SIGMETS** Page. (Figure 7-52 or 7-53)

*NOTE: If no SIGMETS have been recorded on the disk, a page appears displaying the message **NO SIGMETS ON DISK**. If there are no SIGMETS via a Flight Plan update the message reads **NO SIGMETS**. Depress **AFIS**, **PRV**, or **BACK** Key to return to **AFIS MENU** Page.*



Figure 7-52

4. Select Key - DEPRESS TO POSITION cursor over **FROM** field
5. FROM Identifier - VERIFY or INSERT.
6. **ENT** Key - DEPRESS. The cursor will automatically move to the TO Identifier field.
7. TO Identifier- VERIFY or INSERT.
8. ENTER Key - DEPRESS. The cursor will automatically move to **TRANSMIT REQUEST?** (Figure 7-54)
9. **ENT** Key - DEPRESS. The request is downlinked and the system will display the **AFIS MENU** Page with the cursor over Option 3.

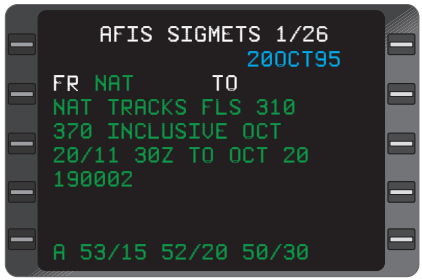


Figure 7-53



Figure 7-54

*NOTE: Wait for **DATA CENTER AK** message if sending multiple requests. A () around the FR and TO waypoints indicates that the updated information has not yet been received.*

10. **AFIS** or **NXT** Key - DEPRESS. Subsequent **SIGMETS** Pages will appear or **AFIS MENU** Page returns with cursor positioned over Option 3.

TERMINAL WEATHER MENU - DATA UPDATE AND REVIEW

1. **AFIS** Key - DEPRESS to display **AFIS MENU** Page.
2. Line Select Key - DEPRESS to position cursor over Option 3, **TERMINAL WX**. (Figure 7-55)
3. **ENT** Key - DEPRESS to display **TERMINAL WX** Menu Page. (Figure 7-56)
4. Line Select Key - DEPRESS to position cursor over the desired Terminal Wx airport identifier.
5. **ENT** Key - DEPRESS.



Figure 7-55

If the desired identifier is enclosed in parentheses, pressing the **ENT** Key will cause it to blink, indicating no weather information is available for that identifier.

If no identifiers are displayed, they may be inserted by pressing the Line Select Key, which will create a cursor over the first blank identifier position. INSERT an airport identifier.



Figure 7-56

6. **ENT** Key - DEPRESS
7. Line Select Key - DEPRESS to position cursor over **TRANSMIT REQUEST?**

8. **ENT** Key - DEPRESS. Identifiers listed on this page will be transmitted to the ground via the data link.

*NOTE: Wait for **DATA CENTER AK** message if sending multiple requests.*

9. If there are identifiers: Placing the cursor over the selected identifier on the terminal weather and pressing **ENT** will display the weather information for the airport. (Figure 7-57)

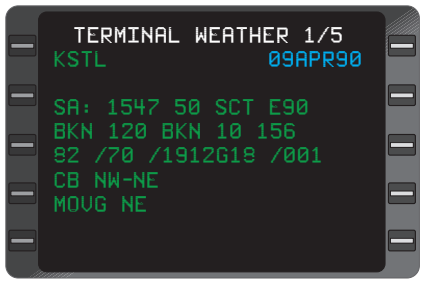


Figure 7-57

10. Weather information - REVIEW.

TO INSERT A NEW IDENTIFIER:

11. Line Select - DEPRESS to position the cursor over the identifier field.

12. IDENTIFIER - INSERT. The data text fields will go blank.

13. **ENT** Key - DEPRESS. The **TERMINAL WX** Menu Page appears with the new identifier in place of the original identifier, and the cursor positioned at the location of the original identifier selected. If there is no data available for this new identifier, it will appear in parentheses.

TO DELETE TEXT WHEN THERE IS NO DATA ENTRY IN PROGRESS:

14. Place cursor over airport identifier on **TERMINAL WX** page.

15. Depress **BACK** key. **DELETE?** will appear.

16. **ENT** Key- Depress to delete the airport identifier.

WINDS ALOFT MENU - DATA UPDATE AND REVIEW

1. **AFIS** Key - DEPRESS to display AFIS MENU Page.

2. Line Select Key - DEPRESS to position cursor over Option 4, **WINDS ALOFT**. (Figure 7-59)



Figure 7-59

3. **ENT** Key - DEPRESS to display **WINDS ALOFT** Menu Page. (Figure 7-60)

4. Line Select Key - DEPRESS to position cursor over the desired Wind identifier.

5. **ENT** Key - DEPRESS.



Figure 7-60

If the desired identifier is enclosed in parentheses, pressing the **ENT** Key will cause it to blink, indicating no weather information is available for that identifier.

If no identifiers are displayed, they may be inserted by pressing the Line Select Key, which will create a cursor over the first blank identifier position. INSERT an identifier. (Usually a VOR or intersection)

6. **ENT** Key - DEPRESS

7. Line Select Key - DEPRESS to position cursor over **TRANSMIT REQUEST?**

8. **ENT** Key - DEPRESS. Identifiers listed on this page will be transmitted to the ground via the data link.

*NOTE: Wait for **DATA CENTER AK** message if sending multiple requests.*

9. If there are identifiers, upon depressing the **ENT** Key, the **WINDS ALOFT** Data Pages pertaining to the selected identifier appear. (Figure 7-61)

10. Wind information - REVIEW.

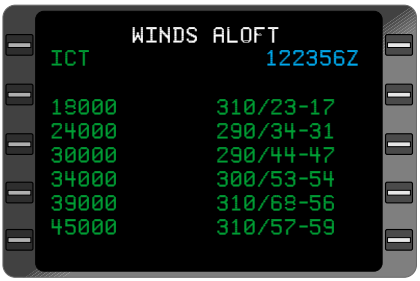


Figure 7-61

TO INSERT A NEW IDENTIFIER:

11. Press Line Select Key to position the cursor over the identifier field.

12. IDENTIFIER - INSERT. The data text fields will go blank.

13. **ENT** Key - DEPRESS. The **WINDS ALOFT** Menu Page appears with the new identifier in place of the original identifier, and the cursor positioned at the location of the original identifier selected. If there is no data available for the new identifier, it will appear in parentheses.

TO DELETE TEXT WHEN THERE IS NO DATA ENTRY IN PROGRESS:

14. Place cursor over identifier on **AFIS WINDS ALOFT** page.
15. Depress **BACK** key the the **ENT** Key.

RECALLING AFIS FLIGHT PLAN

This procedure allows a previously accessed AFIS Flight Plan and associated weather to be recalled from the Global Data Center.

RECALL OPTION 1:

1. **AFIS** Key - DEPRESS to display **AFIS MENU** Page.
2. Line Select Key - DEPRESS to position cursor over Option 5, **RECALL AFIS FPL**. (Figure 7-63)
3. **ENT** Key - DEPRESS. **RECALL AFIS FPL** Page appears.
4. Line Select Key - DEPRESS to position cursor next to **FPL** # field.
5. **FPL** # - INSERT desired AFIS Flight Plan number. (Figure 7-64)



Figure 7-63

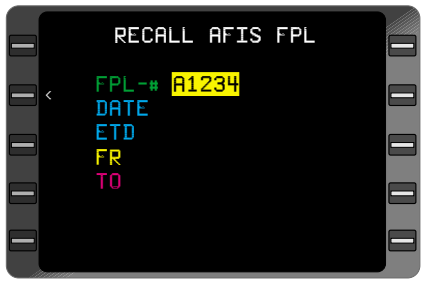


Figure 7-64

6. **ENT** Key - DEPRESS. Cursor is positioned over **TRANSMIT REQUEST?** (Figure 7-65)

7. **ENT** Key - DEPRESS to initiate recalling of AFIS Flight Plan from Global Data Center.



Figure 7-65

*NOTE: For aircraft equipped with the Antenna Switching Unit, if **DATA LINK DISABLED** message appears DEPRESS momentary AFIS annunciator to enable the air to ground data link. Also enable VHF or satellite network.*

Wait for **DATA CENT AK** message if sending multiple requests.

RECALL OPTION 2:

If Flight Plan Number field is blank:

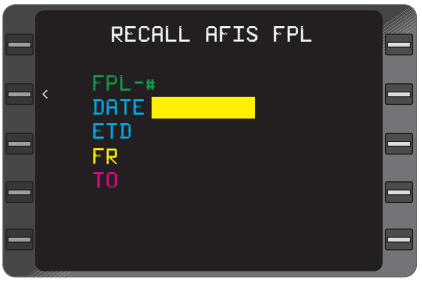


Figure 7-66

1. **ENT** Key - DEPRESS. Cursor will position itself over date field. (Figure 7-66)
2. DATE - INSERT issue date (day, month, year, digits only) of AFIS Flight Plan being recalled.
3. **ENT** Key - DEPRESS.
4. **ETD** - INSERT estimated time of departure in GMT of AFIS Flight Plan being recalled.
5. **ENT** Key - DEPRESS.
6. **FR** field - INSERT origin ICAO Identifier.
7. **ENT** Key - DEPRESS.
8. **TO** field - INSERT destination ICAO Identifier.

9. **ENT** Key - DEPRESS. Cursor is positioned over **TRANSMIT REQUEST?** (Figure 7-67)

10. **ENT** Key - DEPRESS to initiate recalling of AFIS Flight Plan from Global Data Center. **AFIS MENU** Page will appear with cursor positioned over Option 6.

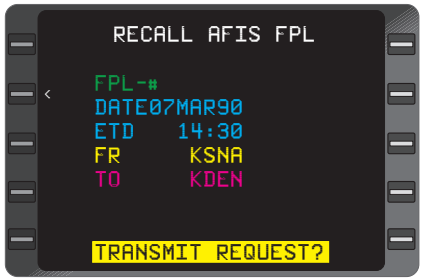


Figure 7-67

*NOTE: SIGMETS ,Winds and Term Wx are automatically updated once the **FPL** is recalled.*

*NOTE: Wait for **DATA CENTER AK** message if sending multiple requests.*

SENDING A TEXT MESSAGE OR PDC

1. **AFIS** Key - DEPRESS to display AFIS MENU Page.

2. Line Select Key - DEPRESS to position cursor over Option 6, **SEND AFIS MSG**. (Figure 7-68)

3. **ENT** Key - DEPRESS. SEND AFIS MESSAGE Page appears. (Figure 7-69) If not requesting PDC proceed to step 7

4. Line Select Key - Depress to position cursor over #: field.

5. INSERT - **PDCXXX** (XXX is departure airport identifier).

6. **ENT** Key - Depress twice to transmit request.

7. **TO** - INSERT receiver of message.



Figure 7-68



Figure 7-69

8. **ENT** Key - DEPRESS.

9. **FR** - INSERT sender's identification (name or tail number).

10. **ENT** Key - DEPRESS.

11. # - INSERT receiver's address. See Table 1 for possible addresses.

12. **ENT** Key - DEPRESS.

13. Message - INSERT text message using the ENTER Key to access each successive line. (Figure 7-70)

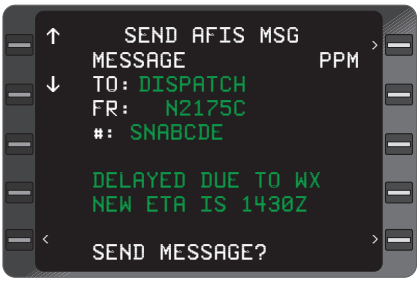


Figure 7-70

NOTE: The cursor remains fixed and the page display moves up or down one line at a time through the cursor. Fifteen lines of text can be entered. (Figure 7-71)



Figure 7-71

The following guidelines are used for entering and editing text:

a. Entering a character causes the character at the cursor position and all the characters to the right to be shifted one position.

b. The **BACK** Key may be used to delete characters one at a time from right to left.

c. The **SP** Key may be used as a spacer to separate words.

d. The **PRV** Key may be used to move the cursor one space to the left.

e. The **NXT** Key may be used to move the cursor one space to the right.

f. The Line Select Key moves cursor to **SEND MESSAGE?** field if a **TO** or # entry field has been inserted.

g. Top two left Line Select keys move cursor up and down page.

11. Line Select Key - DEPRESS to position over **SEND MESSAGE?** It will be necessary to press the **ENT** Key after 15 lines of text, or if there are two succeeding blank lines, in order for the cursor to appear over **SEND MESSAGE**? field. (Figure 7-72)

12. **ENT** Key - DEPRESS. The message is sent to the Global Data Center via the data link.



Figure 7-72

*NOTE: Wait for **DATA CENTER AK** message if sending multiple requests.*

TO RETURN TO THE AFIS MENU PAGE

13. Press **AFIS** or **NXT** Key with the cursor off the page.

SENDING/BUILDING A PREPROGRAMMED MESSAGE

The PREPROGRAMMED MESSAGES MENU Page is accessed from the **SEND AFIS MSG** Page. (Figure 7-73) An entry in the TO or # field must be made before access to PPM is available.



Figure 7-73

1. Line Select Key - DEPRESS to position cursor over the PPM field.
2. **ENT** Key - DEPRESS. Up to six messages can be listed on the **PPM MENU** Page which appears.
3. Line Select Key - DEPRESS to position cursor over desired message title or blank title field. (Figure 7-74)



Figure 7-74

4. MESSAGE TITLE - VERIFY or ENTER. A new title may be entered with a maximum of 18 characters.

 To change an existing title, type characters over the old Title. The **BACK** Key can be used to delete characters one at a time.

NOTE: Whenever a title is changed or erased, the preprogrammed message associated with the title will be erased also.

5. **ENT** Key - DEPRESS. The preprogrammed message associated with that title will appear. If no message has been programmed the display will be blank. Insert message as required up to 7 lines of text.

EDITING/ENTERING A PREPROGRAMMED MESSAGE

6. TEXT - EDIT or ENTER using the following guidelines.

 a. Entering a character causes the character at the cursor position and all the characters to the right to be shifted one position.

 b. The **BACK** Key may be used to delete characters one at a time from right to left.

 c. The **SP** Key may be used as a spacer to separate words.

 d. The **PRV** Key may be used to move the cursor one space to the left.

 e. The **NXT** Key may be used to move the cursor one space to the right.



Figure 7-75

CONTINUE SENDING MESSAGE

7. **NXT** Key - DEPRESS to position cursor over the **SEND MESSAGE?** field. It will be necessary to press the **ENT** Key after seven lines of text in order for the **SEND MESSAGE?** field to appear. (Figure 7-76)

8. **ENT** Key - DEPRESS. The message will be downlinked and the **AFIS MENU** Page will appear. **TO**, **FROM** and # field information of **SEND MESSAGE** Page will be used in downlink message.



Figure 7-76

*NOTE: **DATA LINK DISABLED** will appear in the **SEND MESSAGE?** field if the downlink is disabled.*

Wait for **DATA CENT AK** message if sending multiple requests.

AFIS MESSAGES REVIEW

1. **AFIS** Key - DEPRESS to display **AFIS MENU** Page.
2. Line Select Key - DEPRESS to position cursor over Option 7, **DISPL AFIS MSG**. (Figure 7-77)
3. **ENT** Key - DEPRESS. **DISPLAY AFIS MSG** Page appears.
4. MESSAGE - REVIEW. (Figure 7-78)
5. **AFIS**, **NXT**, **PRV** or **BACK** Key - DEPRESS. Subsequent message pages appear or old **AFIS MENU** Page returns with cursor positioned over Option 8.

NOTE: Messages will remain in the system until the system is powered off.



Figure 7-77



Figure 7-78

SELECTING OPERATING MODES (FOR AFIS USERS EQUIPPED WITH SATELLITE DATA COMMUNICATIONS SYSTEM)

AUTO REPORTING

When the system is initialized, the Automatic Reporting and Auto Wx update function will retain the status at aircraft shutdown. The following procedures allow the function to be turned **OFF** and back **ON**.

TURNING AUTO REPORT / AUTO WX UPDATE OFF

1. **AFIS** Key - DEPRESS to display **AFIS MENU** Page.

2. Line Select Key - DEPRESS to position cursor over Option 8, **OPERATING MODES**. (Figure 7-79)

3. **ENT** Key - DEPRESS.



Figure 7-79

4. Line Select Key - DEPRESS to position cursor over **ON** option of **AUTO REPORT** or **AUTO WX UPDATE** field. (Figure 7-80)

5. **BACK** Key - DEPRESS. OFF appears in the cursor. (Figure 7-81)

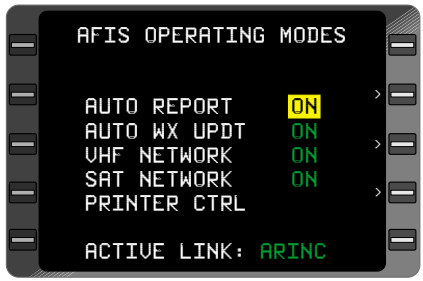


Figure 7-80

6. **ENT** Key - DEPRESS to turn **OFF** the **AUTO REPORT** or **AUTO WX UPDATE** function.

*NOTE: If all networks are **OFF**, then **AUTO REPORT** and **AUTO WX UPDATE** will be **OFF**.*

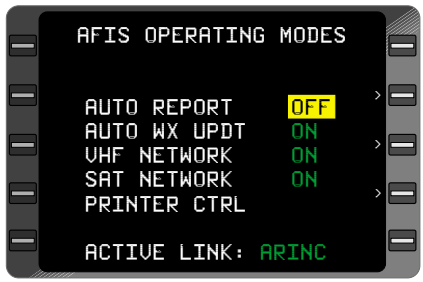


Figure 7-81

RETURNING TO AUTO REPORT/AUTO WX UPDATE

1. **AFIS** Key - DEPRESS to display **AFIS MENU** Page.

2. Line Select Key - DEPRESS to position cursor over Option 8, **OPERATING MODES**. (Figure 7-82)

3. **ENT** Key - DEPRESS.



Figure 7-82

4. Line Select Key - DEPRESS to position cursor over **OFF** option of **AUTO REPORT** or **AUTO WX UPDATE** field. (Figure 7-83)

5. **BACK** Key - DEPRESS. **ON** appears in the cursor. (Figure 7-84)

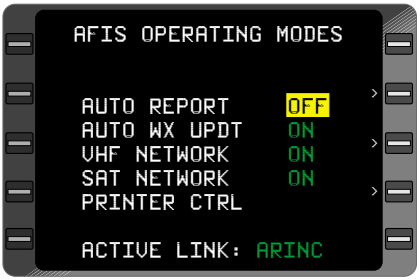


Figure 7-83

6. **ENT** Key - DEPRESS to turn **ON** the **AUTO REPORT** or **AUTO WX UPDATE** function.

*NOTE: If all networks are **OFF**, then **AUTO REPORT** and **AUTO WX UPDATE** will be **OFF**.*

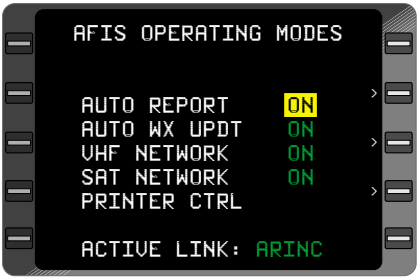


Figure 7-84

AUTO WEATHER UPDATE

When the system is initialized, the Automatic Weather Update function will retain the status at aircraft shutdown. The following procedures allow the function to be turned **OFF** and back **ON**.



Figure 7-85

TURNING AUTO WX UPDT OFF

1. **AFIS** Key - DEPRESS to display **AFIS MENU** Page.
2. Line Select Key - DEPRESS to position cursor over Option 8, **OPERATING MODES**. (Figure 7-85)
3. **ENT** Key - DEPRESS.
4. Line Select Key - DEPRESS to position cursor over **ON** option of **AUTO WX UPDT** field. (Figure 7-86)
5. **BACK** Key - DEPRESS. **OFF** appears in the cursor. (Figure 7-87)
6. **ENT** Key - DEPRESS to turn **OFF** the **AUTO WX UPDT** function.

*NOTE: A Weather Update Request must be performed to notify the GDC of the change in status of **AUTO WX UPDT**.*

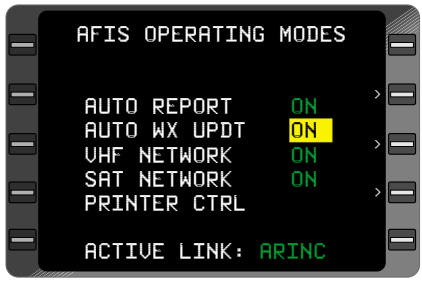


Figure 7-86

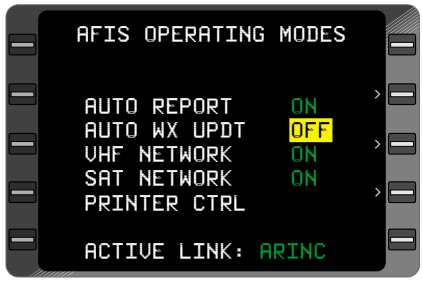


Figure 7-87

RETURNING TO AUTO WX UPDT

1. **AFIS** Key - DEPRESS to display **AFIS MENU** Page.

2. Line Select Key - DEPRESS to position cursor over Option 8, **OPERATING MODES**. (Figure 7-88)



Figure 7-88

3. **ENT** Key - DEPRESS.

4. Line Select Key - DEPRESS to position cursor over **OFF** option of **AUTO WX UPDT** field. (Figure 7-89)

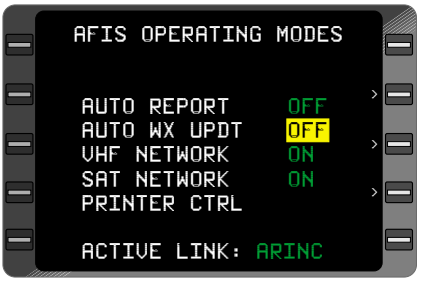


Figure 7-89

5. **BACK** Key - DEPRESS. **ON** appears in the cursor. (Figure 7-90)

6. **ENT** Key - DEPRESS to turn **ON** the **AUTO WX UPDT** function.

*NOTE: A Weather Update Request must be performed to notify the GDC of the change in status of **AUTO WX UPDT**.*

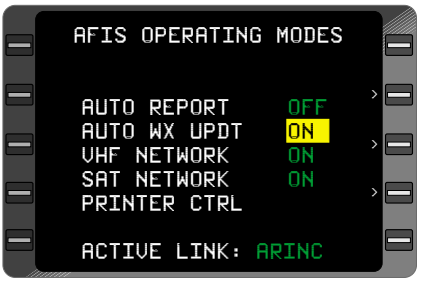


Figure 7-90

VHF AND SATELLITE NETWORK OPERATING MODES

The status of each network is held in non-volatile memory. When the system is initialized, all networks will prefill with the status at system shut-down. The following procedures allow the VHF and satellite networks to be manually operated, turned **OFF**, or returned to **AUTO**.



Figure 7-91

TURNING VHF NETWORK OFF

The VHF network has precedence over the satellite network in areas of shared coverage and must be turned **OFF** in order for **SATCOM** to be the Active Link.

1. **AFIS** Key - DEPRESS to display **AFIS MENU** Page.
2. Line Select Key - DEPRESS to position cursor over Option 8, **OPERATING MODES**. (Figure 7-91)
3. **ENT** Key - DEPRESS.
4. Line Select Key - DEPRESS to position cursor over **ON** option of **VHF NETWORK** field. (Figure 7-92)
5. **BACK** Key - DEPRESS. **OFF**? appears in the cursor. (Figure 7-93)
6. **ENT** Key - DEPRESS to turn the VHF network **OFF**.

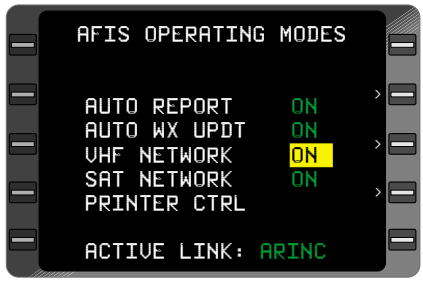


Figure 7-92

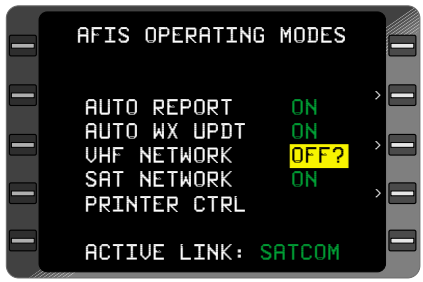


Figure 7-93

*NOTE: The **ACTIVE LINK** information at the bottom of the page indicates the network that is being serviced at that time. If all networks are turned **OFF** or none are operational, **NONE** will be displayed.*

TURNING VHF NETWORK ON

1. **AFIS** Key - DEPRESS to display **AFIS MENU** Page.

2. Line Select Key - DEPRESS to position cursor over Option 8, **OPERATING MODES**.

3. **ENT** Key - DEPRESS.

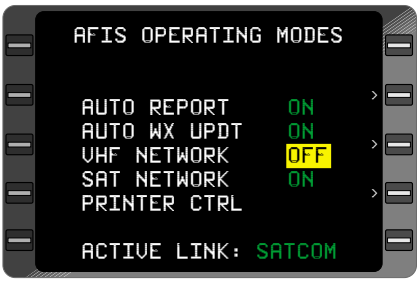


Figure 7-94

4. Line Select Key - DEPRESS to position cursor over **OFF** option of **VHF NETWORK** field. (Figure 7-94)

5. **BACK** Key - DEPRESS. **ON**? appears in the cursor. (Figure 7-95)

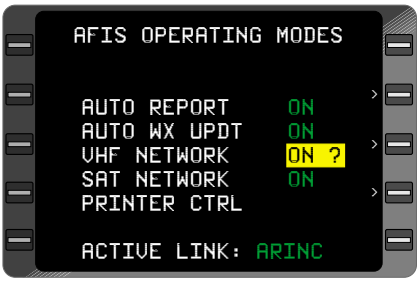


Figure 7-95

6. **ENT** Key - DEPRESS to turn VHF network on. **VHF LINK CONTROL** Page appears. (Figure 7-96)

*NOTE: The **ACTIVE LINK** information at the bottom of the page indicates the network that is being serviced at that time.*

7. Line Select Key - DEPRESS to position cursor over **AUTO** option of desired ground network.

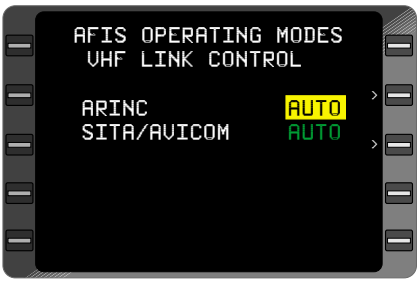


Figure 7-96

TURNING AUTO TO MAN OR OFF

*NOTE: **SITA/AVICOM** are two different ground networks covering different regions. The appropriate network is automatically selected for operation based on current Lat/Lon location of aircraft, if mode is set to AUTO.*

8. **BACK** Key - DEPRESS until **MAN** or **OFF** appears in the cursor.
9. **ENT** Key - DEPRESS to select **MAN** or **OFF**.

*NOTE: If **MAN** is selected, all other networks will indicate OFF. (Figure 7-97)*

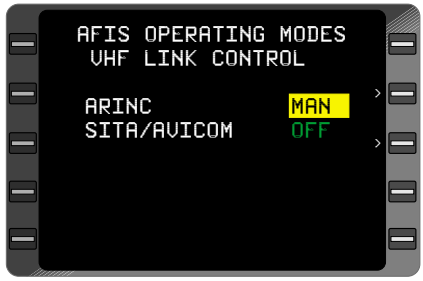


Figure 7-97

10. Repeat Steps 7 through 9 to turn **OFF** desired ground networks or DEPRESS **ENT** Key to cursor through option fields and return to **AFIS OPERATING MODE**s Page.

RETURNING TO AUTO

11. Line Select Key - DEPRESS to position cursor over **OFF** or **MAN** option of desired ground network.
12. **BACK** Key - DEPRESS until **AUTO** appears in cursor. (Figure 7-98)
13. **ENT** Key - DEPRESS to select **AUTO** option.
14. Repeat Steps 11 through 13 to return desired ground networks to **AUTO** or DEPRESS **ENT** Key to cursor through option fields and return to AFIS Operating Modes Page.

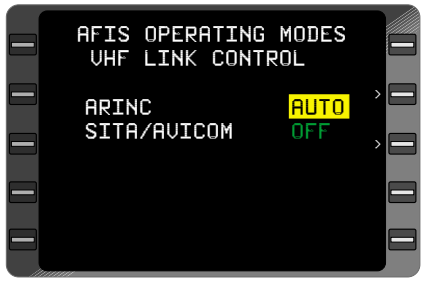


Figure 7-98

TURNING SATELLITE NETWORK OFF

1. **AFIS** Key - DEPRESS to display **AFIS MENU** Page.

2. Line Select Key - DEPRESS to position cursor over Option 8, **OPERATING MODES**. (Figure 7-99)



Figure 7-99

3. **ENT** Key - DEPRESS.

4. Line Select Key - DEPRESS to position cursor over ON option of **SAT** (satellite) **NETWORK** field. (Figure 7-100)

5. **BACK** Key - DEPRESS. **OFF**? appears in the cursor.

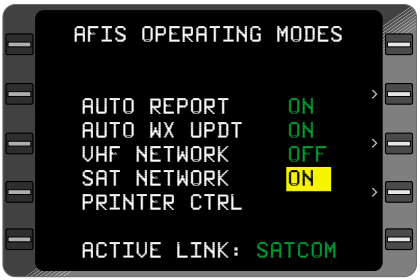


Figure 7-100

6. **ENT** Key - DEPRESS to turn the satellite network **OFF**. (Figure 7-101)

*NOTE: The **ACTIVE LINK** information at the bottom of the page indicates the network that is being serviced at that time. If all networks are turned **OFF** or none are operational, **NONE** will be displayed.*

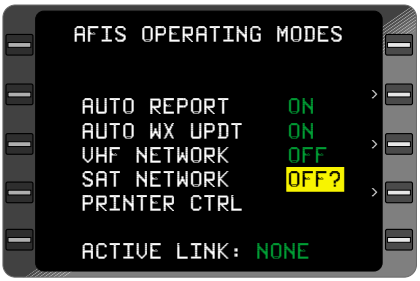


Figure 7-101

TURNING SATELLITE NETWORK ON

The satellite network must be turned **ON** to send non-flight related messages. Since the VHF network has precedence over the satellite network in areas of shared coverage, the **VHF NETWORK** must be turned OFF in order for SATCOM to be the Active Link. If the VHF network cannot be received and the SATCOM mode is set to ON the system will automatically select the SATCOM mode for transmit and receive.

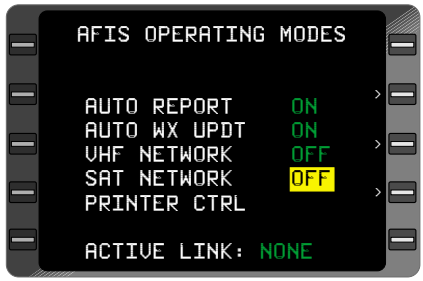


Figure 7-102

1. **AFIS** Key - DEPRESS to display **AFIS MENU** Page.
2. Line Select Key - DEPRESS to position cursor over Option 8, **OPERATING MODES**.
3. **ENT** Key - DEPRESS.
4. Line Select Key - DEPRESS to position cursor over **OFF** option of **SAT NETWORK** field. (Figure 7-102)
5. **BACK** Key - DEPRESS. **ON**? appears in the cursor. (Figure 7-103)

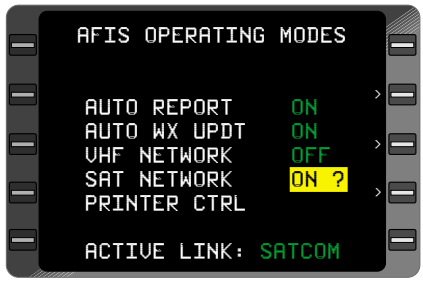


Figure 7-103

*NOTE: The **ACTIVE LINK** information at the bottom of the page indicates the network that is being serviced at that time.*

6. **ENT** Key - DEPRESS to turn satellite network on. **SAT** (satellite) **LINK CONTROL** Page appears with cursor over **AUTO**. (Figure 7-104)



Figure 7-104

DEPRESS **ENT** Key to cursor through option fields and return to **AFIS OPERATING MODES** Page or proceed to Step 7.

TURNING AUTO TO MAN

7. Line Select Key - DEPRESS until **MAN** appears in the cursor.
8. **ENT** Key - DEPRESS. Cursor moves to **REGION** field.
9. **BACK** Key - DEPRESS until desired region appears in cursor, either **W. Atlantic**, **E. Atlantic**, **Pacific**, or **Indian**. (Figure 7-105)



Figure 7-105

10. **ENT** Key - DEPRESS to select region. Cursor moves to **LINK** field. (Figure 7-106)

*NOTE: All other regions are now considered **OFF**.*

11. **ENT** Key - DEPRESS to ACTIVATE the SAT network link as operational and return to **AFIS OPERATING MODES** Page.



Figure 7-106

*NOTE: When in **MAN** mode, the **ACTIVE LINK** will display **NONE** until the aircraft is within the boundaries of the selected region.*

RETURNING TO AUTO

12. Line Select Key - DEPRESS to position cursor over **MAN** field.
13. **BACK** Key - DEPRESS until **AUTO** appears in cursor.
14. **ENT** Key - DEPRESS to select **AUTO** option. Cursor moves to the **LINK** field.
15. **ENT** Key - DEPRESS to ACTIVATE the SAT network link as operational and return to **AFIS OPERATING MODES** Page.

PRINTER CTRL

The AFIS DMU has two RS-232 printer interfaces. Users may print messages or weather to either or both printer ports. Automatic printing is also available. Controls for these options, as well as Auto Form Feed control, are accessed on the **PRINTER CONTROL** page. Auto Form Feed currently applies to the -0211 and the -2011 DMUs. Access the **PRINTER CONTROL** page by line selecting the **PRINTER CTRL** field on the **OPERATING MODES** page and pressing **ENTER**.

MESSAGE DEST

The Message Destination field is used to assign the printer port that will be used when messages are printed. Messages can be sent to printer port 1 (**PRT1**), printer port 2 (**PRT2**), or **BOTH**.

1. **AFIS** key - DEPRESS to display **AFIS MENU** page.
2. Line Select Key - DEPRESS to position cursor over **OPERATING MODES**.
3. **ENTER** Key - DEPRESS.
4. Line Select Key - DEPRESS to position cursor over the **PRINTER CTRL** field. **SEL** will appear in the field.
5. **ENTER** Key - DEPRESS to access the **PRINTER CONTROL** page.
6. Line Select Key - DEPRESS to position cursor over **MESSAGE DEST**.
7. **BACK** Key - DEPRESS to cycle destination field between **PRT1**, **PRT2**, and **BOTH**.
8. **ENTER** Key - DEPRESS to set Message Destination field to its present value (**PRT1**, **PRT2**, or **BOTH**.)

WEATHER DEST

The Weather Destination field is used to assign the printer port that will be used when weather is printed. Weather can be sent to printer port 1 (**PRT1**), printer port 2 (**PRT2**), or **BOTH**.

1. **AFIS** key - DEPRESS to display **AFIS MENU** page.
2. Line Select Key - DEPRESS to position cursor over **OPERATING MODES**.

3. **ENTER** Key - DEPRESS.
4. Line Select Key - DEPRESS to position cursor over **SEL** option of **PRINTER CTRL** field.
5. **ENTER** Key - DEPRESS to access the **PRINTER CONTROL** page.
6. Line Select Key - DEPRESS to position cursor over **WEATHER DEST**.
7. **BACK** Key - DEPRESS to cycle destination field between **PRT1**, **PRT2**, and **BOTH**.
8. **ENTER** Key - DEPRESS to set Message Destination field to its present value (**PRT1**, **PRT2**, or **BOTH**.)

AUTO FORM FEED

The Auto Form Feed option, when set to YES, will cause the printer to Form Feed, or eject the page, after each message or weather report is printed. Setting the Auto Form Feed option to NO will print messages and weather reports on the same page until the page is full, then eject the page.

1. **AFIS** key - DEPRESS to display **AFIS MENU** page.
2. Line Select Key - DEPRESS to position cursor over **OPERATING MODES**.
3. **ENTER** Key - DEPRESS.
4. Line Select Key - DEPRESS to position cursor over **SEL** option of **PRINTER CTRL** field.
5. **ENTER** Key - DEPRESS to access the **PRINTER CONTROL** page.
6. Line Select Key - DEPRESS to position cursor over **AUTO FORM FEED**.
7. **BACK** Key - DEPRESS to toggle Auto Form Feed option between **YES** and **NO**.
8. **ENTER** Key - DEPRESS to set Auto Form Feed to its present value (**YES** or **NO**.)

Auto Form Feed currently applies to the -0211 and the -2011 DMUs.

AUTO PRINT MSG

The Auto Print Message field is used to select or deselect the automatic printing of messages. If **AUTO PRINT MSG** is set to **YES**, then messages will automatically be printed upon receipt. If **AUTO PRINT MSG** is set to **NO**, then messages will not be printed upon receipt.

1. **AFIS** key - DEPRESS to display **AFIS MENU** page.
2. Line Select Key - DEPRESS to position cursor over **OPERATING MODES**.
3. **ENTER** Key - DEPRESS.
4. Line Select Key - DEPRESS to position cursor over **SEL** option of **PRINTER CTRL** field.
5. **ENTER** Key - DEPRESS to access the **PRINTER CONTROL** page.
6. Line Select Key - DEPRESS to position cursor over **AUTO PRINT MSG**.
7. **BACK** Key - DEPRESS to toggle Auto Print Message field between **YES** and **NO**.
8. **ENTER** Key - DEPRESS to set Auto Print Message field to its present value (**YES** or **NO**.)

AUTO PRINT WX

The Auto Print Weather field is used to select or deselect the automatic printing of weather. If **AUTO PRINT WX** is set to **YES**, then weather will automatically be printed upon receipt. If **AUTO PRINT WX** is set to **NO**, then weather will not be printed upon receipt.

1. **AFIS** key - DEPRESS to display **AFIS MENU** page.
2. Line Select Key - DEPRESS to position cursor over **OPERATING MODES**.
3. **ENTER** Key - DEPRESS.
4. Line Select Key - DEPRESS to position cursor over **SEL** option of **PRINTER CTRL** field.
5. **ENTER** Key - DEPRESS to access the **PRINTER CONTROL** page.
6. Line Select Key - DEPRESS to position cursor over **AUTO**

PRINT WX.

7. **BACK** Key - DEPRESS to toggle Auto Print Weather field between **YES** and **NO**.

8. **ENTER** Key - DEPRESS to set Auto Print Weather field to its present value (**YES** or **NO**.)

PRINTING PROCEDURES

PRINTING FLIGHT PLANS

Following is a step by step procedure to print a flight plan in the aircraft:

Note: The aircraft must be specially REGISTERED with the Global Data Center (GDC) for this feature.

1. Enable **AUTO PRINT WX** from the printer control page of the **AFIS OPERATING MODES** page.

2. Select **SEND AFIS MSG** from the **AFIS MENU**.

3. Leave the **TO** and **FR** fields blank. At the address (#) field, type: **PRFPD1234**, where D1234 is the flight plan number.

4. Transmit the request to the GDC.

5. When uplinked, the flight plan will be treated like weather and will print automatically.

PRINTING MESSAGES

Messages may be printed automatically as the message is uplinked, and/or individually at any time.

To Automatically Print Messages Upon Receipt:

1. Select **AUTO PRINT MSG** from the AFIS OPERATING MODES, PRINTER CONTROL page, to **YES**. All uplinked messages will print automatically upon receipt.

To Manually Print a Message:

1. While reviewing the message, line select one of the white caret symbols at the bottom of the message page.

2. The **PRINT MESSAGE?** prompt will display. Press **ENTER** to send the message to the printer currently selected for messages.

To Manually Print All Messages:

1. From the **AFIS MENU**, select the **SEND AFIS MSG** page.
2. On the send message page, leave the **TO** and **FR** fields blank. At the address (#) field, type ONE of the following commands:

MSG 1	Send messages to printer one.
MSG 2	Send messages to printer two.
MSG 3	Send messages to both printers.

3. Press **ENTER** until the **SEND MESSAGE?** prompt is displayed. Press **ENTER** again to initiate printing to the specified printer(s).

PRINTING WEATHER

SIGMETS, Winds Aloft, and Terminal Weather may be printed automatically or manually.

To Automatically Print SIGMETS, Winds Aloft, and Terminal Weather Upon Receipt:

1. Select **AUTO PRINT WX** from the AFIS OPERATING MODES, PRINTER CONTROL page. All SIGMETS, Winds Aloft, and Terminal Weather reports will print automatically as they are received.

To Manually Print All SIGMETS, Winds Aloft, or Terminal Weather:

1. From the **AFIS MENU**, select the **SEND AFIS MSG** page.
2. On the send message page, leave the **TO** and **FR** fields blank. At the address (#) field, type ONE of the following commands (note- there is a space between the command and the numeral, ex. SIG<space>1):

SIG 1	Send SIGMETS to printer one.
SIG 2	Send SIGMETS to printer two.
SIG 3	Send SIGMETS to both printers.
WND 1	Send Winds Aloft to printer one.
WND 2	Send Winds Aloft to printer two.
WND 3	Send Winds Aloft to both printers.

TWX 1	Send Terminal Weather to printer one.
TWX 2	Send Terminal Weather to printer two.
TWX 3	Send Terminal Weather to both printers.

3. Press ENTER until the SEND MESSAGE? prompt is displayed. Press ENTER again to initiate printing to the specified printer.

SELECTING OPERATING MODES (FOR AFIS USERS NOT EQUIPPED WITH SATELLITE DATA COMMUNICATIONS SYSTEM)

AUTO REPORTING

When the system is initialized, the Automatic Reporting and or Auto Wx update function will retain the status at aircraft shutdown. The following procedures allow the function to be turned **OFF** and back **ON**.



Figure 7-107

TURNING AUTO REPORT OFF

1. **AFIS** Key - DEPRESS to display AFIS MENU Page.
2. Line Select Key - DEPRESS to position cursor over Option 8, **OPERATING MODES**. (Figure 7-107)
3. **ENT** Key - DEPRESS.
4. Line Select Key - DEPRESS to position cursor over **ON** option of **AUTO REPORT** field. (Figure 7-108)
5. **BACK** Key - DEPRESS. **OFF** appears in the cursor. (Figure 7-109)
6. **ENT** Key - DEPRESS to turn **OFF** the **AUTO REPORT** function.

*NOTE: If all ground networks are **OFF**, then **AUTO REPORT** will be **OFF**.*

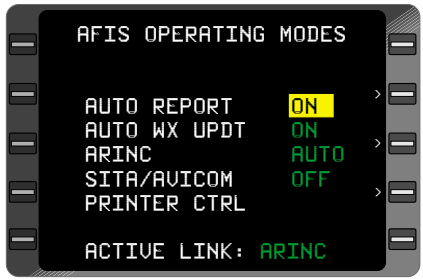


Figure 7-108

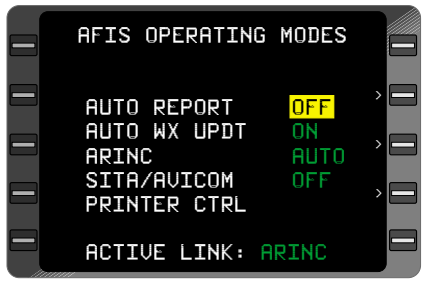


Figure 7-109

RETURNING TO AUTO REPORT

1. **AFIS** Key - DEPRESS to display **AFIS MENU** Page.

2. Line Select Key - DEPRESS to position cursor over Option 8, **OPERATING MODES**. (Figure 7-110)

3. **ENT** Key - DEPRESS.



Figure 7-110

4. Line Select Key - DEPRESS to position cursor over **OFF** option of **AUTO REPORT** field. (Figure 7-111)

5. **BACK** Key - DEPRESS. **ON** appears in the cursor.

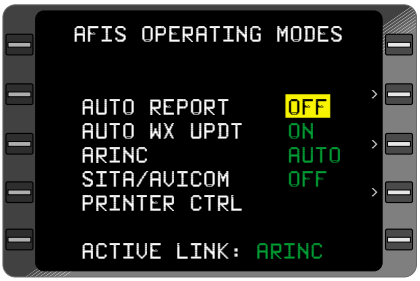


Figure 7-111

6. **ENT** Key - DEPRESS to turn **ON** the **AUTO REPORT** function. (Figure 7-112)

*NOTE: If all ground networks are **OFF**, then **AUTO REPORT** will be **OFF**.*

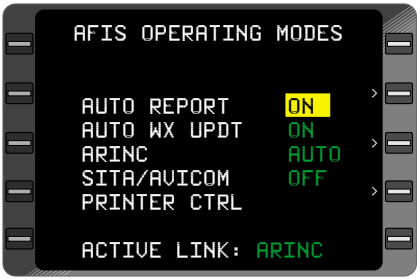


Figure 7-112

AUTO WEATHER UPDATE

When the system is initialized, the Automatic Weather Update function will retain the status at aircraft shutdown. The following procedures allow the function to be turned **OFF** and back **ON**.



Figure 7-113

TURNING AUTO WX UPDT OFF

1. **AFIS** Key - DEPRESS to display **AFIS MENU** Page.

2. Line Select Key - DEPRESS to position cursor over Option 8, **OPERATING MODES**. (Figure 7-113)

3. **ENT** Key - DEPRESS.

4. Line Select Key - DEPRESS to position cursor over **ON** option of **AUTO WX UPDT** field. (Figure 7-114)

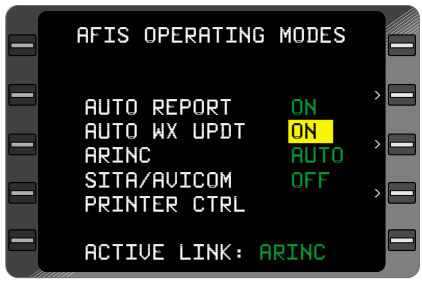


Figure 7-114

5. **BACK** Key - DEPRESS. **OFF** appears in the cursor. (Figure 7-115)

6. **ENT** Key - DEPRESS to turn **OFF** the **AUTO WX UPDT** function.

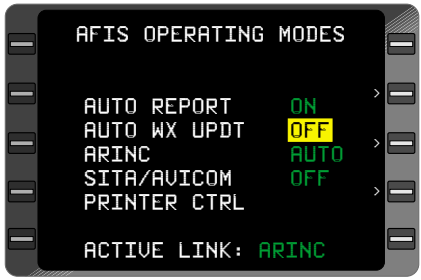


Figure 7-115

RETURNING TO AUTO WX UPDT

1. **AFIS** Key - DEPRESS to display **AFIS MENU** Page.

2. Line Select Key - DEPRESS to position cursor over Option 8, **OPERATING MODES**. (Figure 7-116)

3. **ENT** Key - DEPRESS.



Figure 7-116

4. Line Select Key - DEPRESS to position cursor over **OFF** option of **AUTO WX UPDT** field. (Figure 7-117)

5. **BACK** Key - DEPRESS. **ON** appears in the cursor. (Figure 7-118)

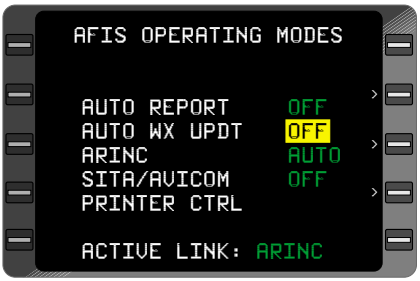


Figure 7-117

6. **ENT** Key - DEPRESS to turn **ON** the **AUTO WX UPDT** function.

*NOTE: A Weather Update Request must be performed to notify the GDC of the change in status of **AUTO WX UPDT**.*

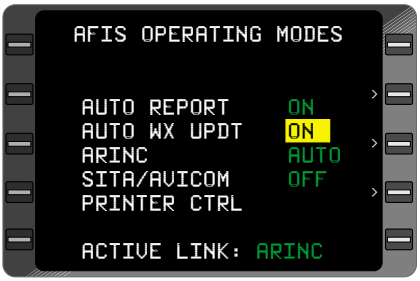


Figure 7-118

GROUND NETWORK OPERATING MODES

The status of each network is held in non-volatile memory. When the system is initialized, all networks will prefill with the status at system shut-down. The following procedures allow the ground networks to be manually operated, turned **OFF**, or returned to **AUTO**.

*NOTE: **SITA/AVICOM** are two different ground networks covering different regions. The appropriate network is selected for operation based on current Lat/Lon location of aircraft.*



Figure 7-119

AUTO TO MAN OR OFF MODE

1. **AFIS** Key - DEPRESS to display **AFIS MENU** Page.
2. Line Select Key - DEPRESS to position cursor over Option 8, **OPERATING MODES**. (Figure 7-119)
3. **ENT** Key - DEPRESS.
4. Line Select Key - DEPRESS to position cursor over **AUTO** option of desired ground network field. (Figure 7-120)
5. **BACK** Key - DEPRESS until **MAN** or **OFF** appears in the cursor.
6. **ENT** Key - DEPRESS to select **MAN** or **OFF** mode. (Figure 7-121)

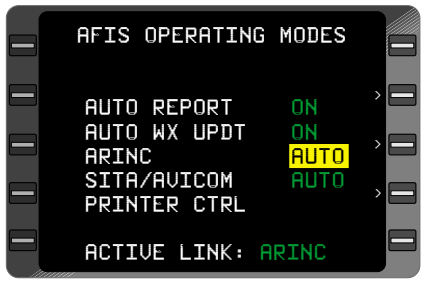


Figure 7-120

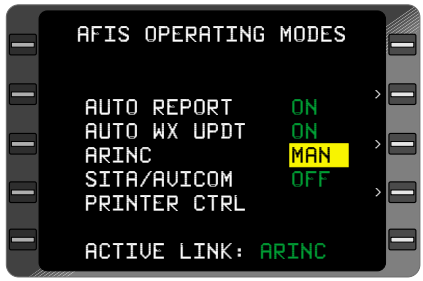


Figure 7-121

*NOTE: If **MAN** is selected, all other networks will indicate **OFF**.*

RETURNING TO AUTO

1. **AFIS** Key - DEPRESS to display **AFIS MENU** Page.
2. Line Select Key - DEPRESS to position cursor over Option 8, **OPERATING MODES**. (Figure 7-122)
3. **ENT** Key - DEPRESS.
4. Line Select Key - DEPRESS to position cursor over **MAN** or **OFF** option of ground network field. (Figure 7-123)
5. **BACK** Key - DEPRESS until **AUTO** appears in the cursor. (Figure 7-124)
6. **ENT** Key - DEPRESS to select **AUTO** mode.



Figure 7-122

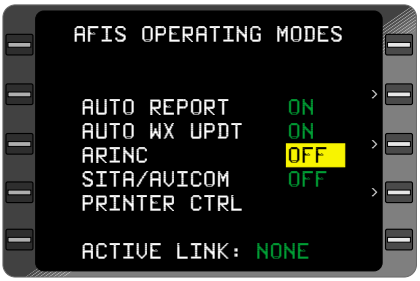


Figure 7-123

*NOTE: **AUTO REPORT**, **AUTO WX UPDT**, and **OPERATING MODE** selection status are stored in non-volatile memory. If the operator turns to **OFF** or **MAN**, the operator must reselect to turn **ON**.*

The **ACTIVE LINK** information at the bottom of the page indicates the network that is being serviced at that time. If the system is operating in automatic mode and the network selected by the present position information is turned **OFF** or none are operational, **NONE** will be displayed.

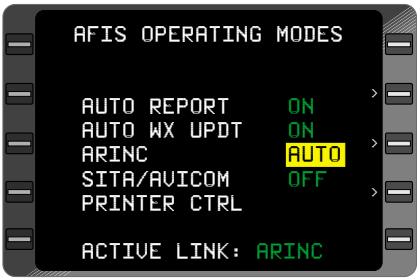


Figure 7-124

UPDATING AFIS FLIGHT PLAN AND WEATHER

UPDATING AFIS FLIGHT PLAN

1. **FPL** Key - DEPRESS to display Active Flight Plan Page.
2. Active Flight Plan - VERIFY the Active Flight Plan route or AMEND as necessary.
3. Line Select Key - DEPRESS until cursor is positioned over **AFIS UPDATE?** (Figure 7-125)
4. **ENT** Key - DEPRESS. **AFIS FPL UPDATE** Page appears with cursor positioned over **ACTUAL FL** value field. (Figure 7-126)



Figure 7-125

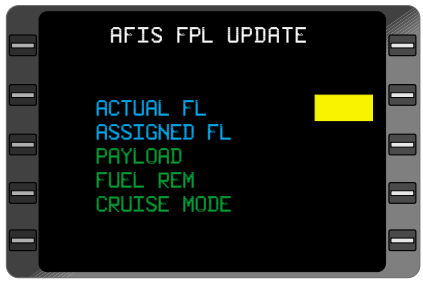


Figure 7-126

NOTE: Values entered are checked against aircraft limitations stored in GDC computers. Invalid entries prevent cursor movement and cause the field to flash. Amend and re-enter to advance cursor.

NOTE: SIGMETS Winds and Terminal Wx are automatically updated when a AFIS FPL update is received.

5. **ACTUAL FL** value - VERIFY or INSERT actual flight level.
6. **ENT** Key - DEPRESS.
7. **ASSIGNED FL** value - VERIFY or INSERT new flight level assignment.
8. **ENT** Key - DEPRESS.
9. **PAYLOAD** value - VERIFY or INSERT amended payload value.
10. **ENT** Key - DEPRESS.
11. **FUEL REM** value - VERIFY or INSERT amended fuel remaining value.
12. **ENT** Key - DEPRESS.

13. **CRUISE MODE** - VERIFY or INSERT an amended cruise mode.

14. **ENT** Key - DEPRESS. The cursor positions over **TRANSMIT REQUEST**? field. (Figure 7-127)

15. **ENT** Key - DEPRESS to initiate a Flight Plan Update. **ACTIVE FPL** Page will appear.

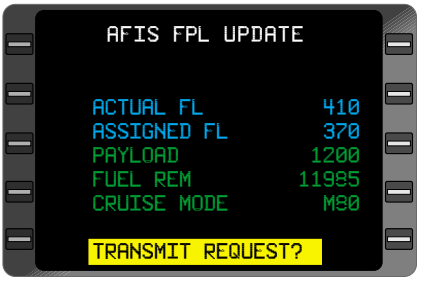


Figure 7-127

*NOTE: For aircraft equipped with the Antenna Switching Unit, if **DATA LINK DISABLED** message appears DEPRESS momentary AFIS annunciator to enable the air to ground data link. Also enable VHF or satellite network.*

Wait for **DATA CENT** AK message if sending multiple requests.

SELECTING UPDATE AS ACTIVE FLIGHT PLAN

1. **FPL** Key - DEPRESS until AFIS FLIGHT PLAN LIST Page appears with Updated Flight Plan (UPDA - XXXX). (Figure 7-128)

2. Line Select Key - DEPRESS to position cursor over Updated Flight Plan.

3. **ENT** Key - DEPRESS. Cursor positions itself over **REPLACE ACTIVE FPL?**

4. **ENT** Key - DEPRESS to replace Active Flight Plan with Updated Flight Plan. (Figure 7-129)

5. ACTIVE FPL - CONFIRM. Updated Flight Plan becomes the Active Flight Plan.



Figure 7-128

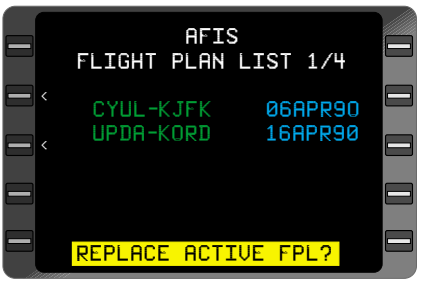


Figure 7-129

UPDATING SIGMETS

1. **AFIS** Key - DEPRESS to display AFIS MENU Page.
2. Line Select Key - DEPRESS to position cursor over Option 2, **SIGMETS**. (Figure 7-130)
3. **ENT** Key - DEPRESS to display first **SIGMETS** Page.
4. Line Select Key - DEPRESS to position cursor over **FROM** field.
5. Desired Identifier - INSERT.
6. **ENT** Key - DEPRESS.



Figure 7-130

NOTE: Parentheses appear indicating a request has not yet been sent or received.

7. Line Select Key - DEPRESS to position cursor over **TO** field.
8. Desired Identifier - INSERT.
9. **ENT** Key - DEPRESS.
10. Line Select Key - DEPRESS to position cursor over **TRANSMIT REQUEST**? (Figure 7-131)
11. **ENT** Key - DEPRESS to initiate a SIGMET update.



Figure 7-131

*NOTE: When an updated SIGMET is received it replaces all previous SIGMETS. If **NAT** is entered as **FR** option, a North Atlantic Tracks update is sent. (Figure 7-132)*



Figure 7-132

Wait for **DATA CENT AK** if sending multiple requests.

UPDATING WEATHER

1. **AFIS** Key - DEPRESS to display AFIS MENU Page.
2. Line Select Key - DEPRESS to position cursor over Option 3, **TERMINAL WX**. (Figure 7-133)
3. **ENT** Key - DEPRESS to display **TERMINAL WX** Menu Page.
4. Line Select Key - DEPRESS to position cursor in next available field. (Figure 7-134)



Figure 7-133

NOTE: If desired, when no field is available, place cursor over an existing identifier.

5. Terminal ICAO Identifier - INSERT.
6. **ENT** Key - DEPRESS. The newly entered ID appears in parentheses on the Menu.
7. Repeat Steps (5) and (6) to enter additional requests.



Figure 7-134

8. Line Select Key - DEPRESS to position cursor over **TRANSMIT REQUEST**?
9. **ENT** Key - DEPRESS. Identifiers listed on this page will be transmitted to the ground via the data link.

*NOTE: Wait for **DATA CENTER AK** if sending multiple requests.*

TO UPDATE TERMINAL WEATHER DATA PAGES

10. Access the **TERMINAL WEATHER** Data Page (Figure 7-135) by selecting an Identifier on the **TERMINAL WX MENU** Page.

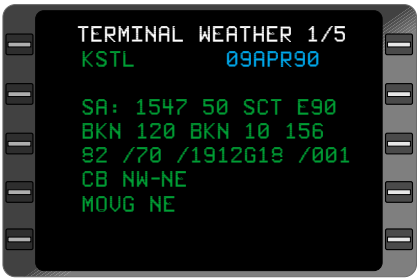


Figure 7-135

TO INSERT A NEW IDENTIFIER

11. Line Select Key - DEPRESS to position the cursor over the identifier field.

12. IDENTIFIER - INSERT. The data text fields will go blank.

13. **ENT** Key - DEPRESS. The **TERMINAL WEATHER** Menu Page appears with the new identifier in place of the original identifier, and the cursor positioned at the location of the original identifier selected. If there is no data available for the new identifier, it will appear in parentheses.

UPDATING WINDS ALOFT

1. **AFIS** Key - DEPRESS to display AFIS MENU Page.

2. Line Select Key - DEPRESS to position cursor over Option 4, **WINDS ALOFT**. (Figure 7-137)

3. **ENT** Key - DEPRESS to display **WINDS ALOFT** Menu Page.

4. Line Select Key - DEPRESS to position cursor in next available field. (Figure 7-138)



Figure 7-137

NOTE: If desired, when no field is available, place cursor over existing identifier.

5. Desired Identifier - INSERT.

NOTE: Identifier can be VOR, airport, waypoint, Lat/Lon or VORTAC ident.



Figure 7-138

6. **ENT** Key - DEPRESS. The newly entered ID appears in parentheses on the Menu.

7. Repeat Steps (5) and (6) to enter additional requests.

8. Line Select Key - DEPRESS to position cursor over **TRANSMIT REQUEST**?

9. **ENT** Key - DEPRESS. Identifiers listed on this page will be transmitted to the ground via the data link.

*NOTE: Wait for **DATA CENTER AK** if sending multiple requests.*

TO UPDATE THE WINDS ALOFT DATA PAGES

10. Access the **WINDS ALOFT** Data Pages (Figure 7-139) by selecting an identifier on the **WINDS ALOFT** menu Page.

TO INSERT A NEW IDENTIFIER

11. Line Select Key - DEPRESS to position the cursor over the identifier field.

12. IDENTIFIER - INSERT. The data text fields will go blank.

13. **ENT** Key - DEPRESS. The **WINDS ALOFT** Menu Page appears with the new identifier in place of the original identifier, and the cursor positioned at the location of the original identifier selected. If there is no data available for the new identifier, it will appear in parentheses.

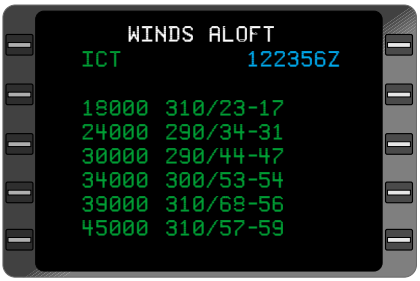


Figure 7-139

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